THE FOUNDRY—

for MAY 1947

VOLUME 75 NUMBER 5

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ONE WAY PROTECTS

AMERICAN CAR AND FOUNDRY COMPANY
Huntington, W. Va.

SMOKE VALVE

Sure, a good foundryman can make his cores with any core oil —but the fact remains that most of them do make their cores with Linoil. There are more foundrymen in America who do use Linoil than there are who do not. Foundrymen who think Linoil the best on the market buy and use over 500,000 gallons of Linoil every month. They can't be wrong.

7¾" VALVE

JOURNAL BEARING

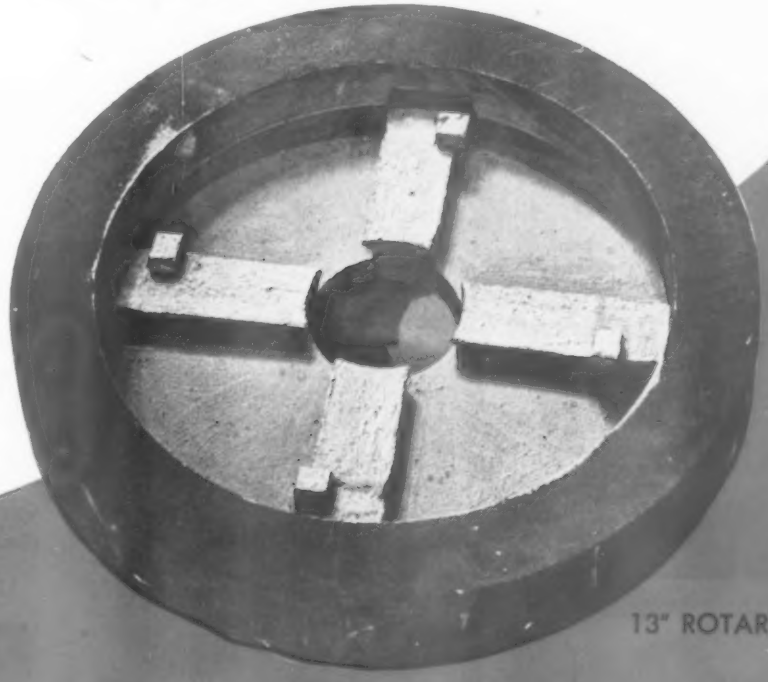
TUYERE

..THE *LINOIL* WAY FOUNDRY PROFITS

It's so easy for any foundryman to test Linoil and see what it is all about. One trial drum—run it through regular routine but check the results. Then start increasing sand ratio with Linoil until you reach the limit. You are safe at the limit because Linoil is uniform. Check bench, blower, oven, cores, castings, cleaning.

LINOIL

If you do not find Linoil the best you ever used send back the trial drum. Linoil is moderately priced but its big selling point is its performance. Linoil protects profits.



13" ROTARY WHEEL CORE

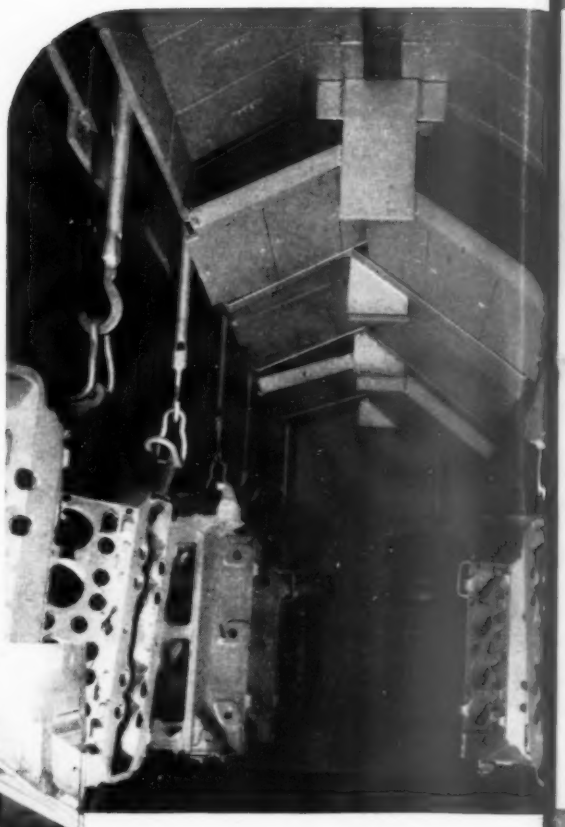
THE LINOIL — THE LOGICAL OIL

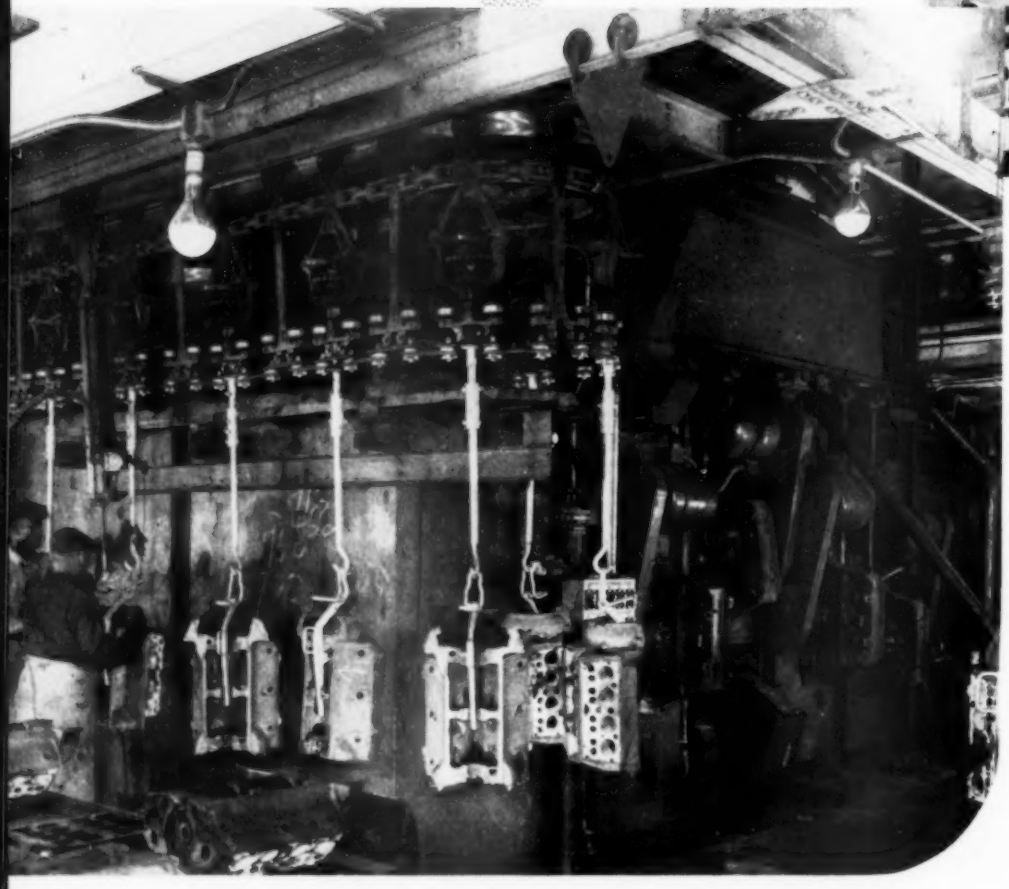
WERNER G. SMITH COMPANY

(DIVISION OF ARCHER-DANIELS-MIDLAND COMPANY)

2191 WEST 110th STREET — CLEVELAND 2, OHIO

"BOY SCOUT PACE" HELPS FAMOUS





WORK RUNS TO CLEANING STATION ...WALKS THROUGH BLAST STREAM

The Pangborn-designed Two-Speed Conveyor brings the work up to the cleaning station *fast* . . . moves it *slowly* through the blast stream . . . then *hurries* it to the next station. Since the work turns as it slowly advances through the blast stream, all irregular surfaces and pockets are completely exposed for effective, uniform cleaning. One pass through the cabinet cleans the casting.

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

BLAST CLEANS CHEAPER WITH THE RIGHT

AUTO-MAKER TO Speed Blast Cleaning

You remember the Boy Scout pace — so many steps running, so many steps walking.

Something like that — built into special Pangborn ROTOBLAST* Cabinets — is helping a well-known automotive manufacturer to increase the rate of blast-cleaning cylinder blocks by 44% . . . with a corresponding decrease in costs.

720 BLOCKS PER HOUR

This company had used Pangborn ROTOBLAST equipment for 12 years. Needing additional production, they ordered three new ROTOBLAST Cabinets, each with five ROTOBLAST units. The new equipment was expected to handle 600 blocks per hour.

But Pangborn's recommendation of the Boy-Scout-pace method of conveying the work produced a bonus of 20% more-than-expected production per hour.

Another valuable feature is the all-metal traveling seal to replace the former rubber seal covering the opening where the hook arm enters the cabinet. The new seal — an integral part of the conveyor — positively prevents the abrasive from spraying out of the cabinet, saving abrasive and eliminating a messy condition around the cabinets.

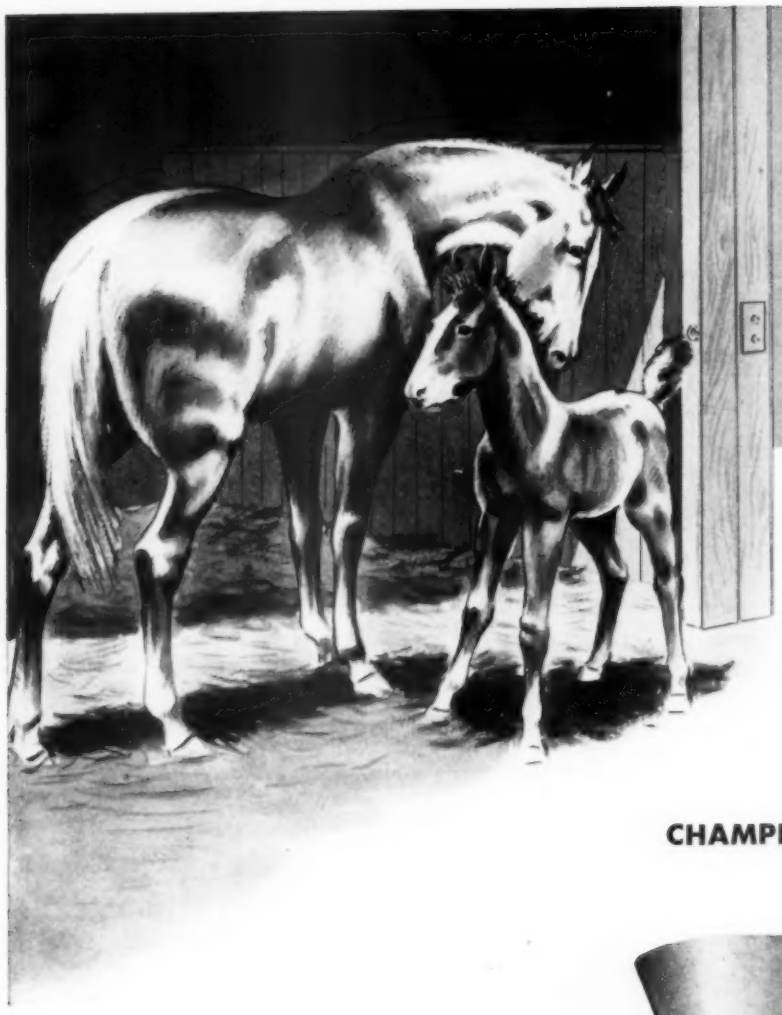
19 AUTO PLANTS USE ROTOBLAST

Improvements like these explain the popularity of Pangborn equipment in the automotive industry. 19 installations (totalling 76 ROTOBLAST units) help motor makers to save time, increase output, produce cleaner metal, facilitate inspection and finishing. For information on the many exclusive advantages of the ROTOBLAST method — airless, high-speed, non-crushing, non-waste — write Pangborn, *world's largest manufacturer of blast cleaning and dust control equipment*. Pangborn Corporation, 1300 Pangborn Boulevard, Hagerstown, Maryland.

*Trademark of the Pangborn Corporation

44%

EQUIPMENT FOR EVERY JOB



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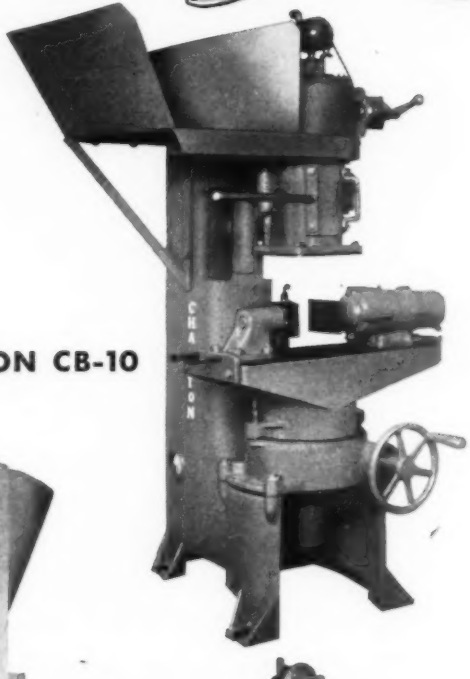
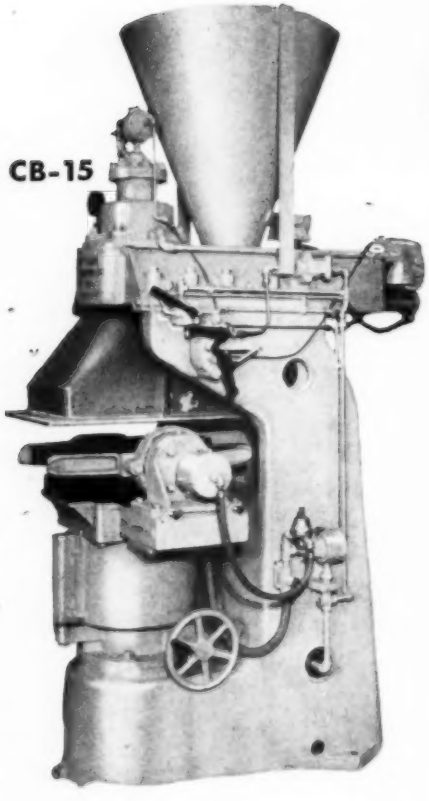
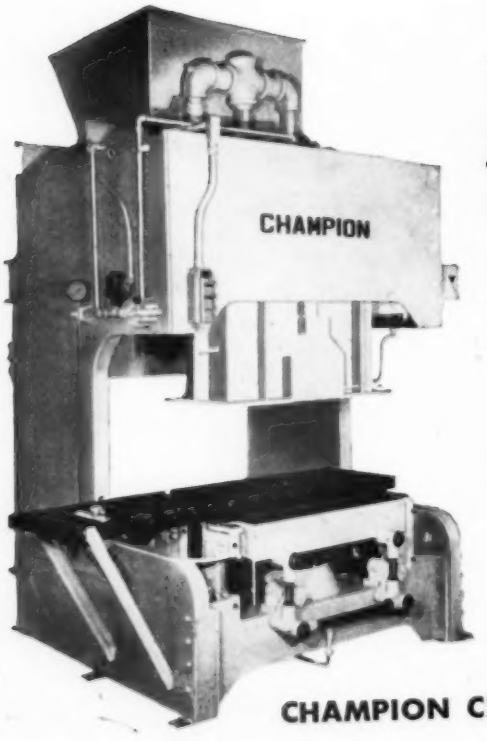
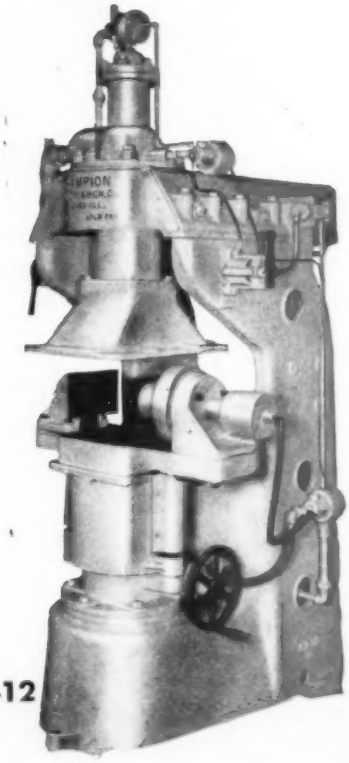


CHAMPION CB-10

CHAMPION CB-15







CHAMPION CB-12

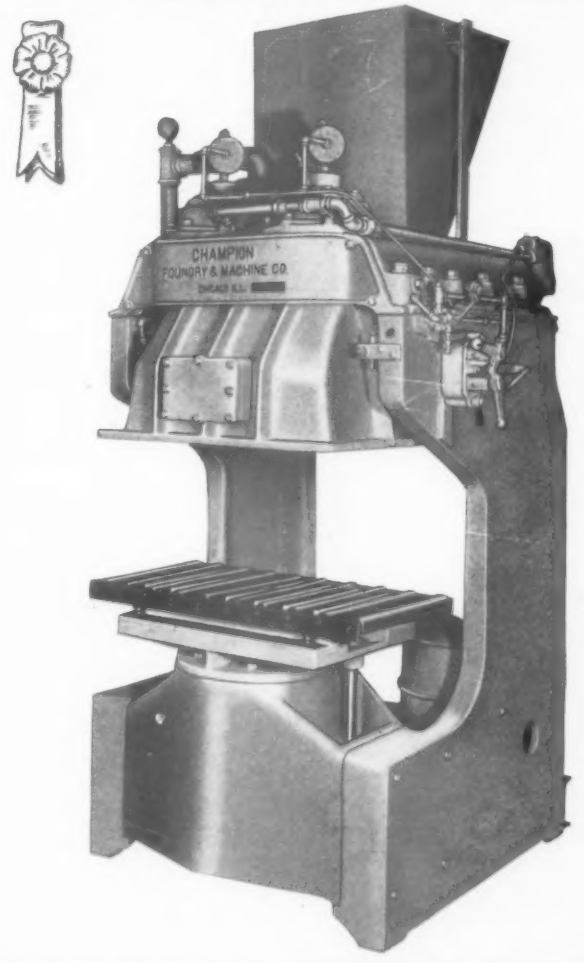
CHAMPION CB-400

...n Line of Champions

COMES A NEW CORE BLOWER . . .

The CB-18

Constantly seeking improved performance to keep abreast of the advances of the foundry industry, Champion engineers have developed the new model CB-18 Core Blower, a worthy member of the Champion family and qualified for a star position on your team. The Champion line of five machines offers a range of size that will meet the requirements of the great majority of foundries. Each model possesses those distinctive features that are enabling some of the world's leading foundries to produce more cores of uniformly higher quality. In the days just ahead, when competition becomes keener, you will be glad you have Champions working on your team!



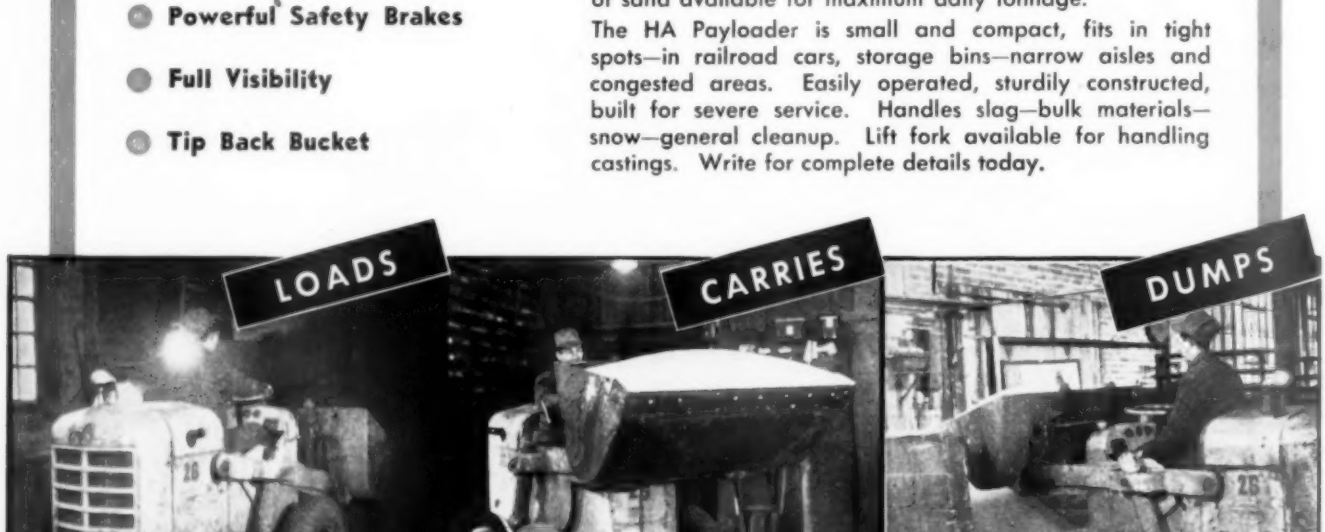
CHAMPION FOUNDRY AND MACHINE CO.
1318 W. 21st STREET CHICAGO 8, ILLINOIS

Saves LABOR
Cuts COSTS
Increases PRODUCTION
HOUGH *Payloader*

- **Bucket capacity—10½ cu. ft.**
- **Large Easy Rolling Wheels**
- **Powerful Safety Brakes**
- **Full Visibility**
- **Tip Back Bucket**

Hough Payloaders pay their way every day handling moulding and core sand, in foundries throughout the country. Fast, versatile and powerful, they replace wheelbarrow crews, cut labor costs and keep a steady supply of sand available for maximum daily tonnage.

The HA Payloader is small and compact, fits in tight spots—in railroad cars, storage bins—narrow aisles and congested areas. Easily operated, sturdily constructed, built for severe service. Handles slag—bulk materials—snow—general cleanup. Lift fork available for handling castings. Write for complete details today.



LOADING MOLDING SAND—Payloader bucket specially shaped to load quickly and easily.

CARRYING CORE SAND — Maneuvers easily through congested aisles. Tip-back bucket prevents spillage, operator has full visibility.

DUMPING CORE SAND — Payloader keeps constant supply of core sand available in main storage and auxiliary bins.

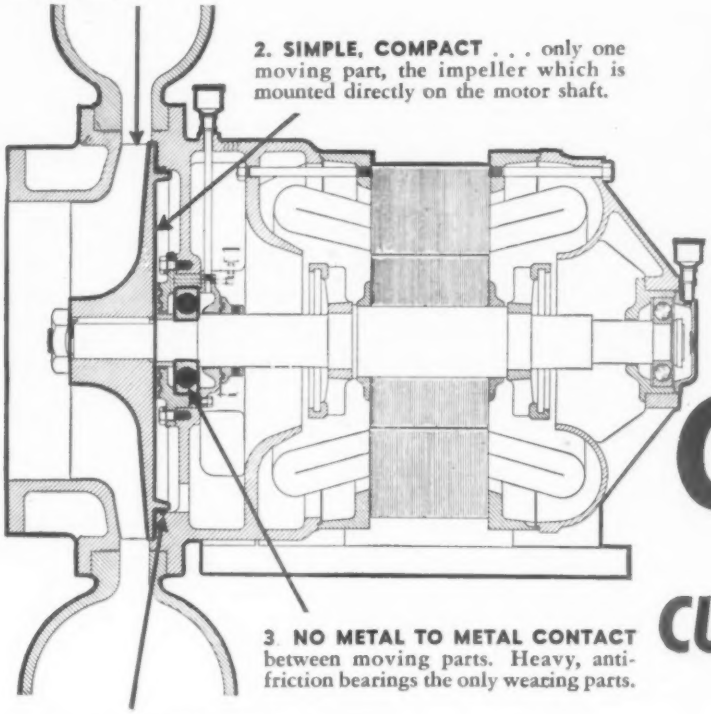
THE FRANK G. HOUGH CO.

MATERIAL HANDLING EQUIPMENT

703 SUNNYSIDE AVE. LIBERTYVILLE, ILL.

1. BOTH BLOWER AND MOTOR built by Allis-Chalmers, designed to operate together . . . entire responsibility rests in one company.

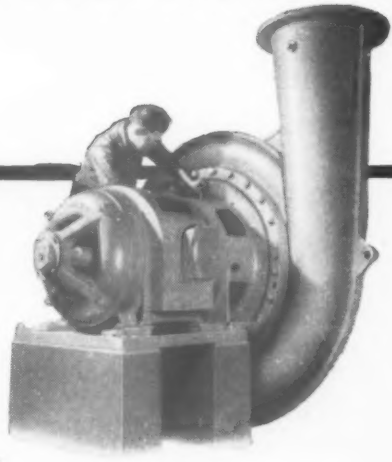
2. SIMPLE, COMPACT . . . only one moving part, the impeller which is mounted directly on the motor shaft.



3. NO METAL TO METAL CONTACT between moving parts. Heavy, anti-friction bearings the only wearing parts.

4. SEAL RING ON IMPELLER balances end thrust . . . reduces bearing loads to a minimum.

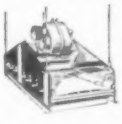
IT PAYS TO Specify Allis-Chalmers CUPOLA BLOWERS!



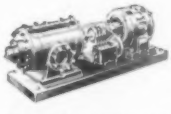
IT'S JUST SOUND BUSINESS to have *all* the facts in selecting a cupola blower. A check with your consultants or engineers will disclose for example, that: the design of *Allis-Chalmers* blowers stems from *60 continuous years* building high-speed rotating equipment. Further, *hundreds* of A-C cupola blowers have been furnished . . . and the very first units are *still operating!*

The blower is only a *small* part of total cupola investment . . . yet it's a *big* factor in overall operating economy. That's why we say —compare *before* you buy . . . prove to yourself that it pays to specify "Allis-Chalmers". Ask your engineers. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

A-C BUILDS BASIC MACHINES, BLOWERS, PUMPS, DRIVES, ELECTRICAL EQUIPMENT FOR FOUNDRIES



YOU GET BUYER'S CHOICE in Allis-Chalmers complete foundry screen line. *Low-Head, Aero-Vibe, Ripl-Flo* and *Utah* electric screens handle every foundry screening.



ROTARY AIR COMPRESSORS for operation of foundry air tools. *Ro-Flo* units are quiet in operation . . . light in weight . . . will run for years with a minimum of maintenance.

MOTORS OF EVERY TYPE, from 1 hp up, for all foundry power requirements. Totally enclosed, fan-cooled motors keep out dirt . . . require less maintenance.

SEND FOR NEW BULLETIN 07B6092A, "Foundry Mechanization" — It's packed with helpful, usable information on the *entire* Allis-Chalmers line of heavy foundry equipment.

A 2186

ALLIS·CHALMERS

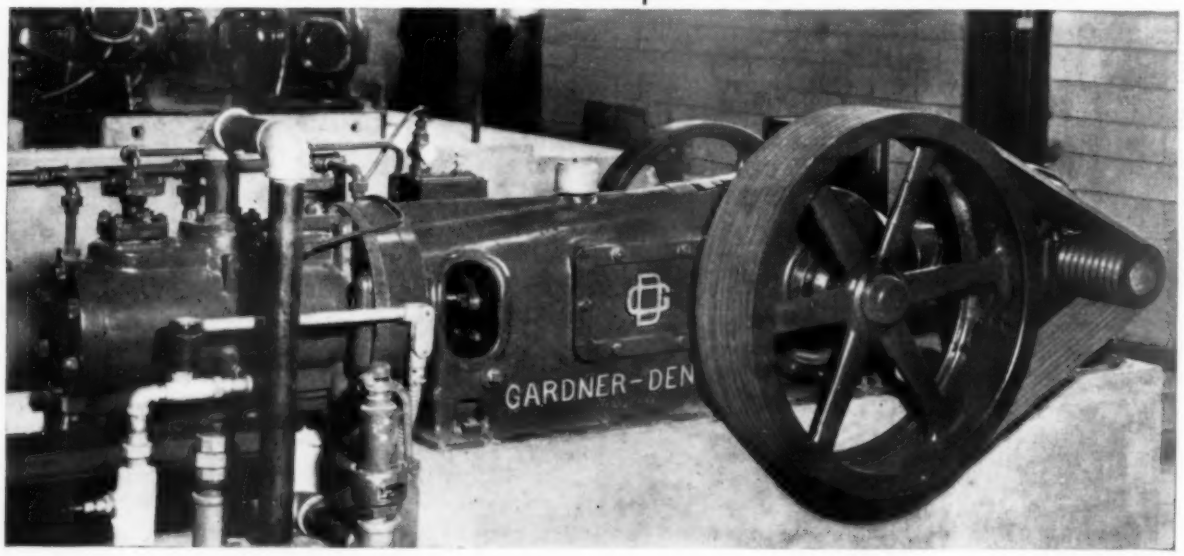
One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

1847 1947 A CENTURY OF SERVICE to Industry THAT MADE America Great

where service is round the CLOCK

FOR full-load, heavy-duty, continuous service, an air compressor must be *rugged*. And that's why ruggedness is built into every part of the Gardner-Denver "RX" Compressor. From its strongly ribbed frame to its alloy iron cylinders, it is engineered to stay on the job — day after day, month after month. Here are some of its features:

- *Special cylinder design for high volumetric efficiency and low horsepower requirements*
- *Duo-plate cushioned valves—simple, durable, unusually quiet.*
- *Crankshaft supported by Timken adjustable double row tapered roller bearings.*
- *Large and unrestricted port areas help reduce heat of compression; insure effective lubrication with minimum oil consumption.*
- *Suction valve unloaders on all inlet valves result in lowest power consumption during unloaded period.*
- *Oil-tight, dust-tight construction.*



Gardner-Denver Class "RX" Single Stage Horizontal Compressor—available in capacities from 89 to 1292 cubic feet displacement per minute.

GARDNER-DENVER

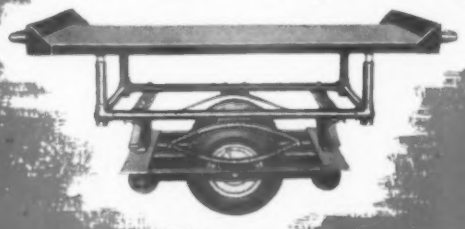
SINCE 1859

USE COMPRESSED AIR FOR SAFETY CONVENIENCE FLEXIBILITY

For complete information, write Gardner-Denver Company, Quincy, Illinois.

ACCLAIMED! APPROVED! ACCEPTED!

MODEL B-1
Intermediate elliptical springs provide extra cushioning protection. Load capacity, 700 lbs.



MODEL A-27-J
Elliptical springs and inner coil springs (in the upright supports) assure correct resiliency. Platform, 27" x 60". Load capacity, 600 lbs.

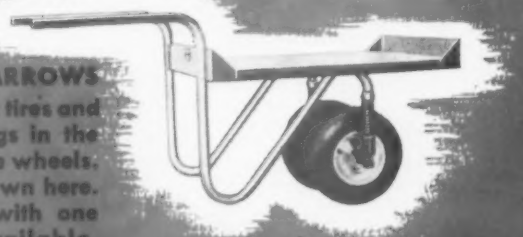
PNEUMATIC CORE TRUCKS

Since 1925 foundries have been using CMD PNEUMATIC CORE TRUCKS to speed up the handling of cores and reduce chafing and breakage. In many places costs have been reduced from 50 to 75 per cent.

Write Today

for bulletin describing and illustrating CMD Pneumatic Core Trucks, Core Barrows, Resilient Core Racks, and other foundry specialties.

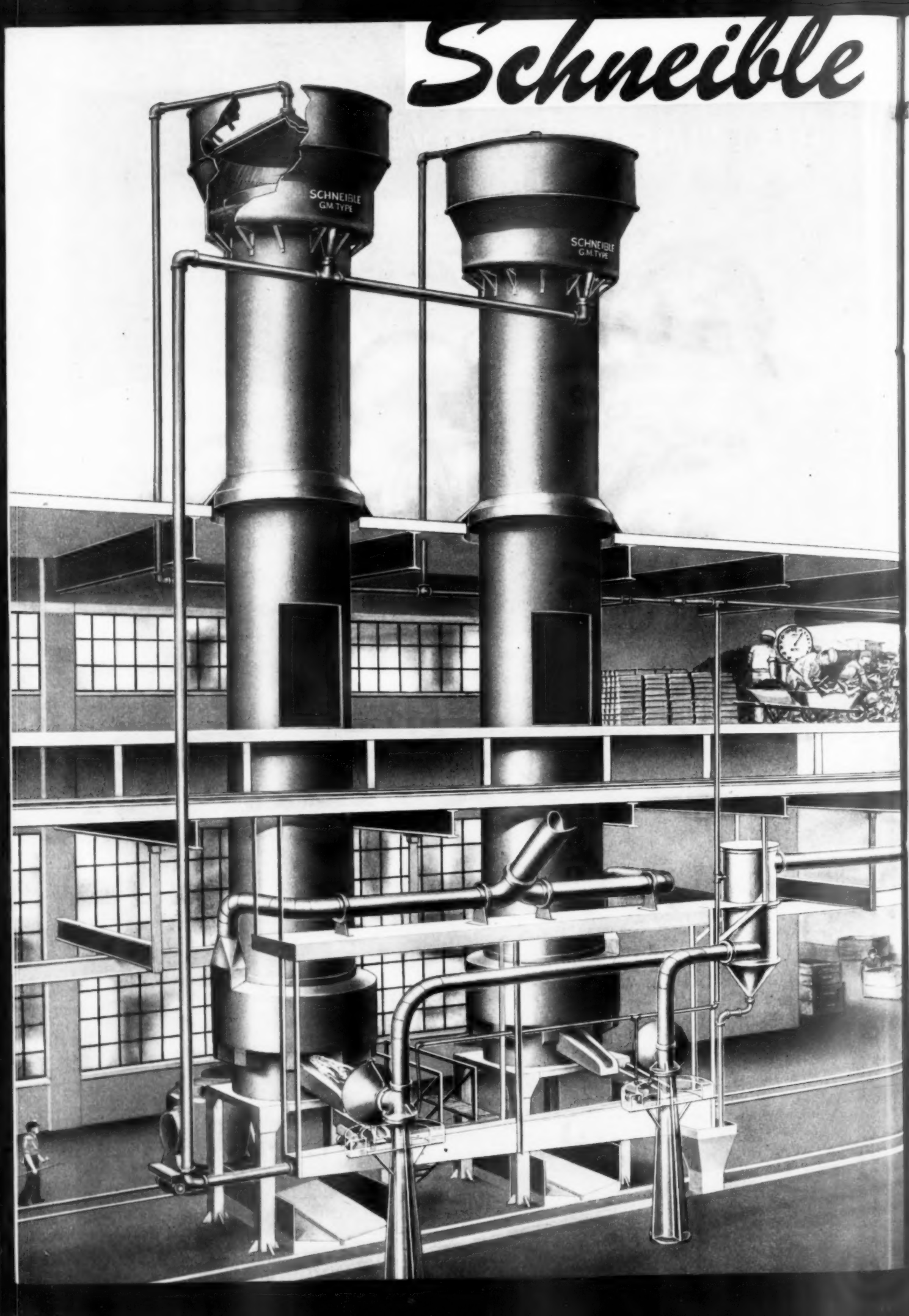
MODEL A-27
For the heaviest loads, this giant carrier is widely used. Heavy-duty elliptical springs and inner coil springs (in the upright supports) quickly absorb shocks that could chafe or break cores. Three sizes: 27" x 60", 800 lbs. capacity; 27" x 72"—1,000 lbs. capacity; and 27" x 84"—1,200 lbs. capacity.



CMD CORE BARROWS
Have pneumatic tires and inner coil springs in the uprights over the wheels. MODEL C-2 shown here. MODEL C-1 (with one wheel) also available.

CHICAGO MANUFACTURING AND DISTRIBUTING CO.

1928 WEST 46th STREET CHICAGO 9, ILLINOIS


Schneible
SCHNEIBLE
G.M. TYPE
SCHNEIBLE
G.M. TYPE

IN THE MELTING DEPARTMENT

Schneible terminates for good the dust, fume and slag nuisance originating in the melting department.

Schneible "GM" Type Cupola Collectors efficiently remove large particles of material that ordinarily fall on foundry roofs and in yards.

The Schneible Mineral Wool "Katchall" is a water-cooled funnel which can be swung to one side when not in use. Coarse material, wetted down, spills into the slag trough. The finer material blasted from the slag hole is drawn into a small Schneible Multi-Wash Collector.

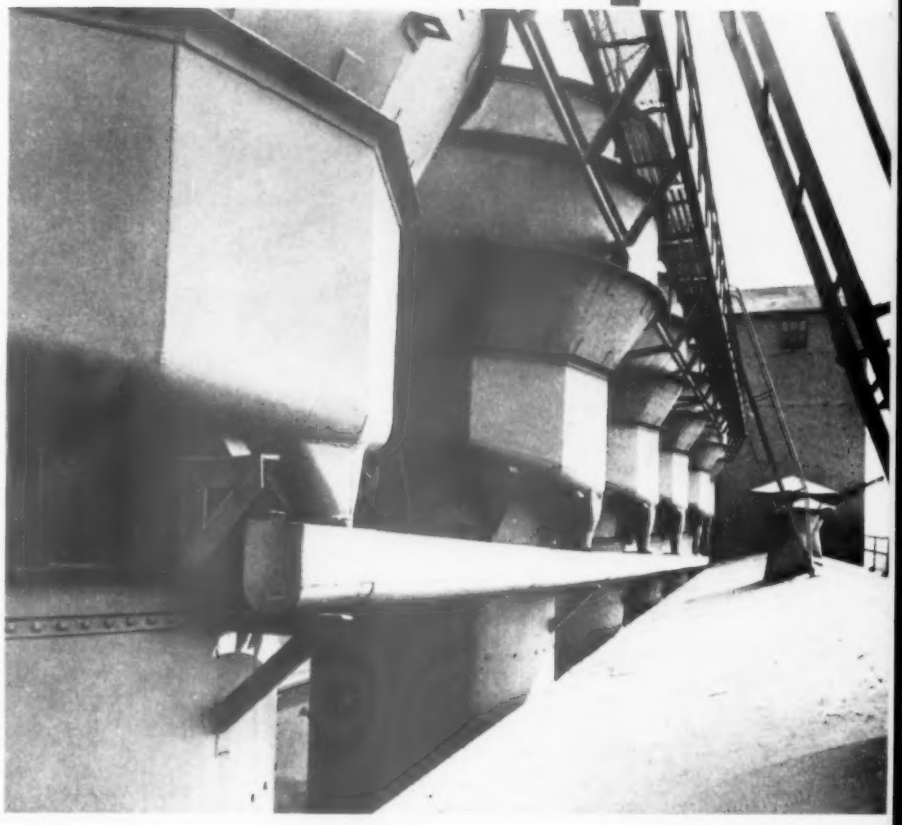
Schneible Slag Quenching Equipment generally re-uses cupola collector water.

Schneible DeWatering System to meet your particular requirement for disposal of collected solids.

●

The waste and fume problems of electric furnaces and non-ferrous melting departments are likewise being completely solved with correctly engineered Schneible equipment.

CLAUDE B. SCHNEIBLE CO.
2827 Twenty-Fifth St. Detroit 16, Mich.
Engineering Representatives in Principal Cities



FOR MOLDS FAST and ECONOMICAL

POWER—you need lots of it—well directed, to make perfect molds fast and cheap.

Herman Engineers with their research directed solely on molding problems and molding machine design have made a specialty of applying power correctly, smoothly and economically to molding machines. Herman Molding Machines employ fast, sure, powerful, steady hydraulic power... and only Herman Molding Machines give the *patented* roll-over action that provides a complete 180° roll-over with power applied on only 90° of the roll!

Ask to have a Herman Engineer call on you to explain the advantages Herman Molding Machines offer in increasing mold production at lower unit cost—and molds that produce perfect castings.

MEMBER

MANUFACTURERS' ASSOCIATION, INC. FOUNDRY EQUIPMENT

MOLDING HERMAN MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

Bleeding Ingots

bubbled out of existence

Today, "flushing" – bubbling a dry inert gas through metal just before casting – is the most efficient and economical method of eliminating "wild heats" or "bleeding ingots".

The test blocks shown on the left are typical examples. Both are 14% straight chrome stainless steel from the same heat. The test shown on the top, however, has a cheesy, porous structure – due to evolution of dissolved gas at the instant of freezing.

On the other hand, the bottom test block shows a perfectly dense structure – the result of flushing the molten metal prior to casting with an Airco inert gas – today's method for producing sound castings.

Airco Booklet ADR-35 gives you valuable information about this exceptional process which can be applied to both ferrous and non-ferrous metals. Fill in and mail the coupon for your copy. Air Reduction, 60 East 42nd Street, New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, Houston 1, Texas. Represented Internationally by Airco Export Corporation.

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Offices in All Principal Cities

Headquarters for Oxygen, Acetylene and other Gases . . . Carbide . . . Gas Welding and Cutting Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories

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Air Reduction
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New York 17, N. Y.

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IT'S NEW—IT'S SENSATIONAL

LASTS MANY TIMES LONGER

Here at last is peak efficiency in Shot and Grit for blast CLEANING and PEENING. AMASTEEL SHOT and GRIT are far better than ordinary hard iron abrasives because they are TRUE ALLOY STEEL.

Compared to regular blasting materials, AMASTEEL offers an amazing superiority due to its long life and resistance to breakdown and greater CLEANING and PEENING speed. This feature means additional savings on labor, handling, storage, freight costs, and dust disposal.

AMASTEEL is produced under exclusive patents and is available in sizes that meet all CLEANING and PEENING requirements.

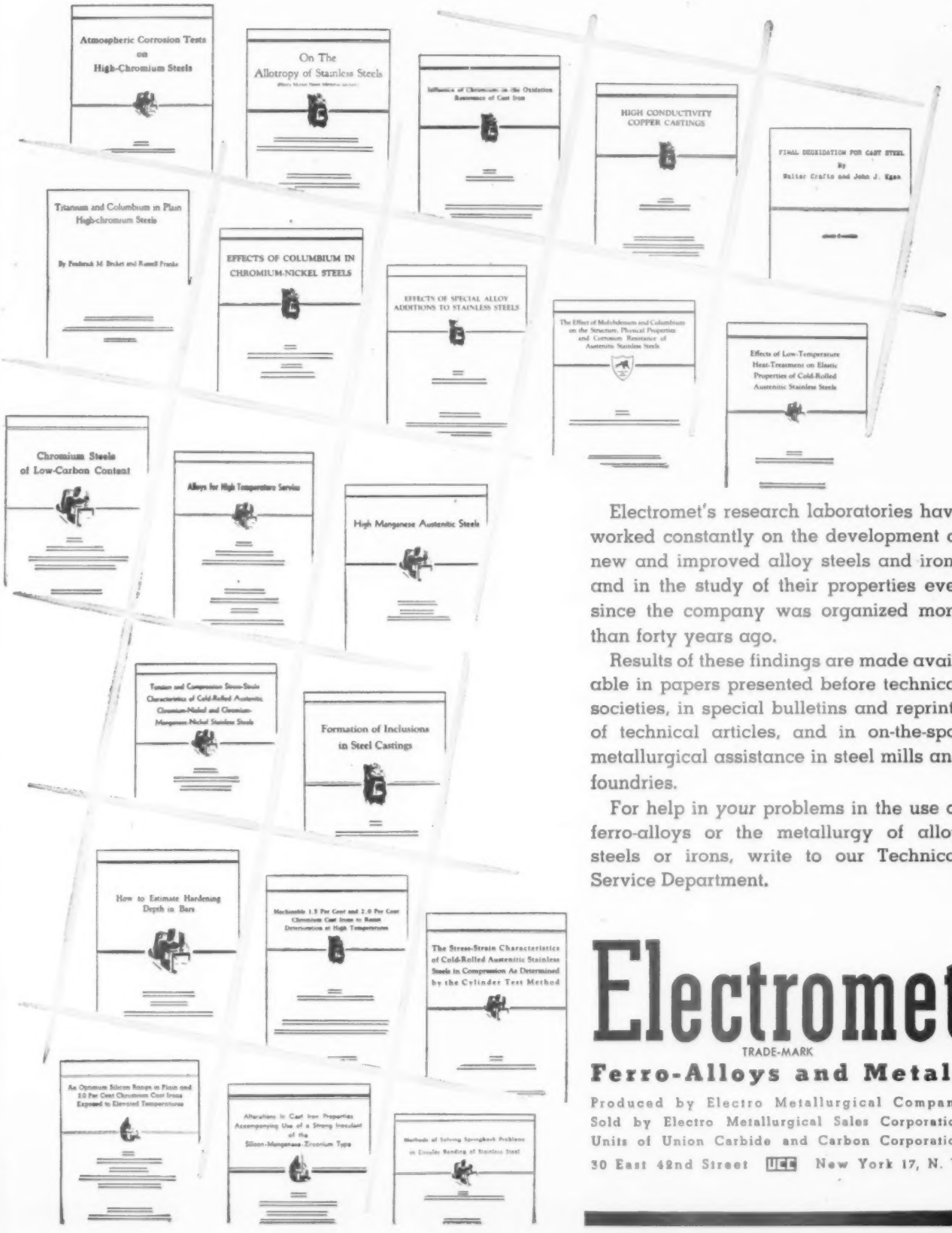
Investigate AMASTEEL Shot and Grit today.

PRODUCERS OF
PEENBLAST
AND
CLEANBLAST

ALLOY METAL ABRASIVE CO.

311 WEST HURON ST. ANN ARBOR, MICH.

FACTS FOR STEELMAKERS...
from Electromet Research


Atmospheric Corrosion Tests on High-Chromium Steels
On The Allotropy of Stainless Steels
HIGH CONDUCTIVITY COPPER CASTINGS
FINAL DEOXIDATION FOR CAST STEEL
By
Walter Crafts and John J. Egan
Titanium and Columbium in Plain High-chromium Steels
By Frederick M. Becket and Russell Franks
EFFECTS OF COLUMBIUM IN CHROMIUM-NICKEL STEELS
EFFECTS OF SPECIAL ALLOY ADDITIONS TO STAINLESS STEELS
The Effect of Molybdenum and Columbium on the Structure, Physical Properties and Corrosion Resistance of Austenitic Stainless Steels
Effects of Low-Temperature Heat-Treatment on Elastic Properties of Cold-Rolled Austenitic Stainless Steels
Chromium Steels of Low-Carbon Content
Alloys for High Temperature Service
High Manganese Austenitic Steels
Formation of Inclusions in Steel Castings
How to Estimate Hardening Depth in Bars
The Stress-Strain Characteristics of Cold-Rolled Austenitic Stainless Steels in Compression As Determined by the Cylinder Test Method
Alterations in Cast Iron Properties Accompanying Use of a Strong Inoculant of the Silicon-Manganese-Zirconium Type

Electromet's research laboratories have worked constantly on the development of new and improved alloy steels and irons and in the study of their properties ever since the company was organized more than forty years ago.

Results of these findings are made available in papers presented before technical societies, in special bulletins and reprints of technical articles, and in on-the-spot metallurgical assistance in steel mills and foundries.

For help in *your* problems in the use of ferro-alloys or the metallurgy of alloy steels or irons, write to our Technical Service Department.

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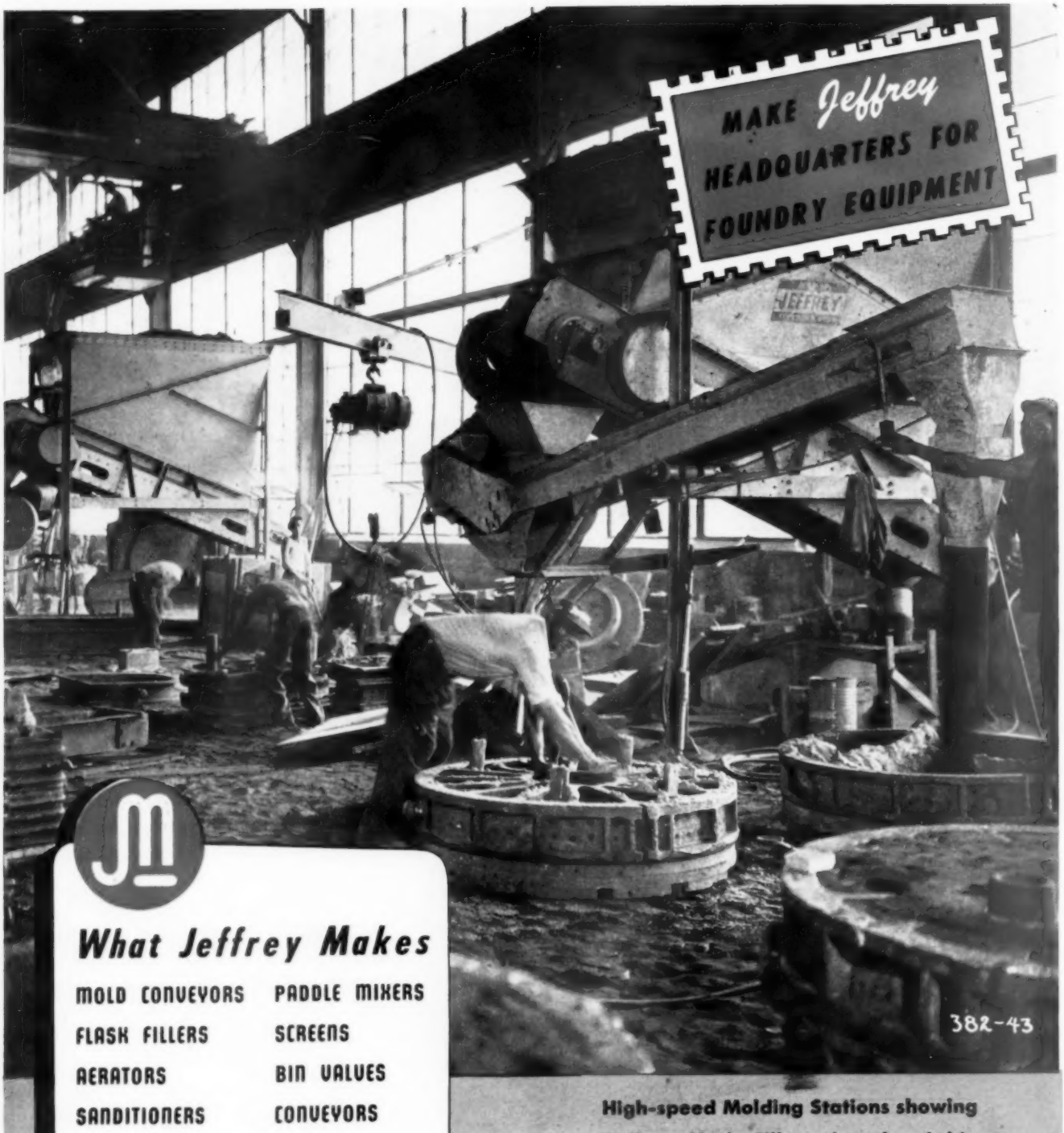
Ferro-Alloys and Metals

Produced by Electro Metallurgical Company
Sold by Electro Metallurgical Sales Corporation
Units of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.



What Jeffrey Makes

MOLD CONVEYORS
PADDLE MIXERS
FLASK FILLERS
SCREENS
AERATORS
BIN VALVES
SANDITIONERS
CONVEYORS
BUCKET ELEVATORS

High-speed Molding Stations showing Jeffrey Flask Fillers (overhead bin type) in operation.

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Complete Line of Material Handling, Processing and Mining Equipment

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WE WERE HERE WHEN MILWAUKEE WAS SPELLED M-I-L-W-A-U-K-I-E!

MILWAUKIE, 1847 — A frontier settlement celebrates its first birthday . . . and a small factory turns out its first product—*millstones.*

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In building a *better* millstone, crusher, turbine, motor—Allis-Chalmers has earned the respect and confidence of men in every industry.

We are proud to serve this basic pattern of American life: Power and Electrical — Mining and Rock Processing—Ferrous and Non-Ferrous Metal Producing — Metal Working — Food — Textile — Chemical — Petroleum — Wood — Rubber — General Manufacturing — Transportation — Construction — Public Works — Agriculture — National Defense. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

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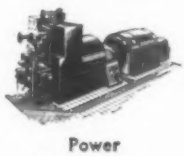

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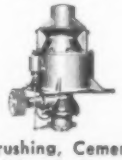
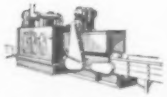
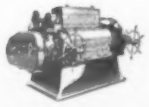


Crushing, Cement, Mining Equipment

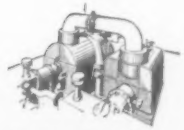


Pulp, Paper, Saw-Mill Equipment



Food, Milling & Extraction Equipment

Chemical & Pyro-Process Equipment



Marine & Defense Equipment

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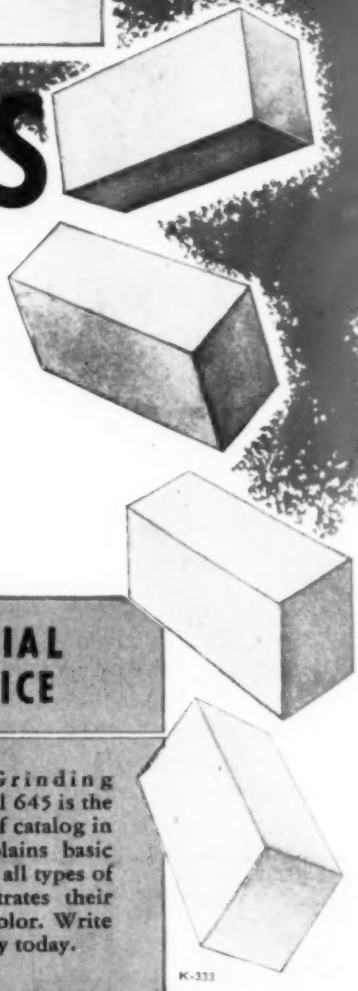
A 2192

CUT-OFF WHEELS



Even tool bit stock yields without a heating struggle to the keener, harder grits in true-running, amazingly strong, super-safe Electro CUT-OFF WHEELS. They work on anything. Ferrous and non-ferrous metals. Even on ceramics. Wafer thin, they minimize friction, save materials, reduce cutting time from minutes to seconds; and leave a fine finish on both sides of the cuts.

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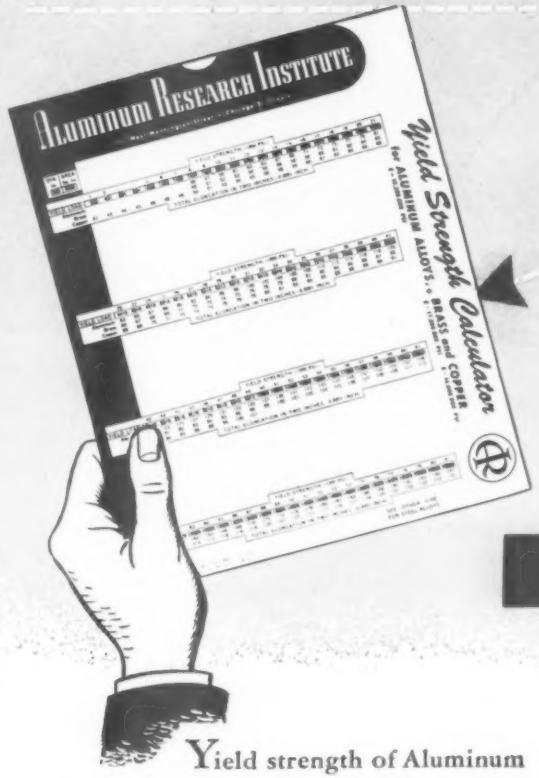
STRONG! • SAFE! • EFFICIENT!

New Accurate RAPID METHOD

For YIELD STRENGTH Determination



- For Aluminum Alloys, Brass, Copper, Steel (carbon and low alloy)
- By Calculator — Without Stress-Strain Curves
- Results obtained in 3 minutes
- Method described in *ASTM Bulletin*, March, 1947

AN A.R.I. PROJECT FOR INDUSTRY

Yield strength of Aluminum Alloys, Brass, Copper and Steel (carbon and low alloy) can now be determined in a fraction of the time usually required.

The ARI YIELD STRENGTH CALCULATOR is new, convenient, accurate, economical, and as easy to use as a slide-rule. One skilled operator can run as many as 20 complete tests per hour.

Developed at the Case School of Applied Science as part of a continuing research program for Aluminum Research Institute, and described in a paper by Ebert, Fried, and Toole in the *ASTM Bulletin* for March, 1947, the ARI YIELD STRENGTH CALCULATOR is offered at approximate cost of production.

Printed in color on heavy varnished stock, size 8″ x 10″, it is mailed in convenient filing envelope.

ARI Yield Strength Calculators are available from Aluminum Research Institute at $1.00 each, postpaid

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Let's look grinding costs in the face

You may get a surprise when you look your grinding costs in the face.

You may find profits wearing down with every turn of the wheel.

Here's our proposal to bring your grinding costs to rock bottom: let Peninsular engineers give your grinding operation a complete study—your machines, the materials you grind, the wheels you use.

From this study, Peninsular will develop grinding wheels to keep your production costs down. For 58 years, Peninsular engineers have been performing this service for industry.

They have learned that each grinding job has its special needs. *Every* Peninsular grinding wheel is specially made for its particular job.

The Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7, Michigan. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Pittsburgh, Houston, St. Louis, Cincinnati.

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INDIVIDUALLY PENINSULAR *ENGINEERED*

GRINDING WHEELS

SINCE 1889

SPECIALISTS IN RESINOID BONDED WHEELS

This Peninsular "face" is a disc wheel for rough grinding, with smaller photographs of the same wheel for eyes, the mouth a surface grinding segment edge, and the hat a cylinder wheel for surface grinding.

Solve your DUST PROBLEM with **DUSTUBE**

The solution of your dust problem can be as simple as the CLOTH TUBE DESIGN, by means of which DUSTUBE traps the finest dust particles with nearly 100% efficiency. This design accounts also for DUSTUBE'S economy of operation . . . low cost maintenance.

Because of large expansion chambers, generous tube spacing and more thorough cloth cleaning there is less resistance to air flow in a DUSTUBE. Result: SAVINGS IN POWER. Dustube cloth filters are never under tension, never in contact with abrading wire screens or frames. Each filter can be easily inspected without disassembling any part whatever. When necessary, an inexpensive replacement tube can be installed in less than a minute by one man, using only his hands. Result: ROCK BOTTOM MAINTENANCE COST.

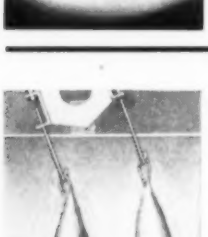
These features mean LOW COST operating and maintenance

LONGER CLOTH LIFE

DUSTUBE cloth filters outlive other types, because the tubes are never under tension . . . No metal contacts corrode or abrade them . . . coarse, heavy dusts never reach the cloth—they are immediately deposited in the hopper below.

UNRESTRICTED AIRFLOW

Tube openings vary from 5" to 8" depending on the size of unit selected. They are completely open, offering no resistance to the flow of air. Ample spacing of tubes insures against bridging of dust between filters.

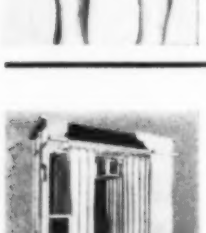


HIGHLY EFFICIENT SHAKER METHOD

Shaking is accomplished when the filter tubes are deflated. A whipping motion imparted by the shaker completely removes accumulated dust from the tubes. This method is easy on the cloth, yet fast and thorough in action.

ONE MAN INSTALLS TUBES IN SECONDS

So simply is DUSTUBE designed that its filter tubes may be replaced in seconds by one man, using only his two hands. He merely hangs the tube on a hook attached to the shaker channel overhead, and inserts the spring band in the cell plate below.



TRAPS EXTREMELY FINE DUST PARTICLES

It has been proven, by actual performance results, that DUSTUBE meets the most exacting requirements. Even dusts within the low micron range, such as silica dust, are trapped with nearly 100% efficiency.

EASY INSPECTION

Every tube in a DUSTUBE may be seen during operation . . . from a central walkway in the Knocked-Down type collector, or from the doorway of an assembled type collector. It is not necessary to remove filters, or unfasten bolts or clamps.

For complete information about the many advantages of DUSTUBE dust collectors, write TODAY. Ask for Catalog 72.

American
WHEELABRATOR & EQUIPMENT CORP.
(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)
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DUST COLLECTORS

To bring you

A COMPLETELY *NEW* MELTING FURNACE . . .

TWO GREAT NAMES IN INDUSTRIAL FURNACES JOIN FORCES

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Manufacturers of Electrical Equipment and Heat Treating Furnaces

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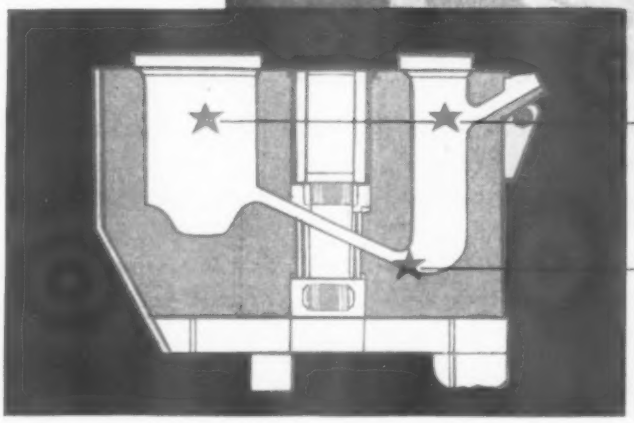
ELECTRIC INDUCTION MELTING FURNACE



TWO OUTSTANDING DESIGN IMPROVEMENTS

DUAL CHAMBER construction permits continuous pouring . . . charging cold metal within reasonable limits does not affect pouring temperature.

STRAIGHTLINE MELTING CHANNELS are easy to clean, therefore ideal for aluminum as well as other non-ferrous alloys.

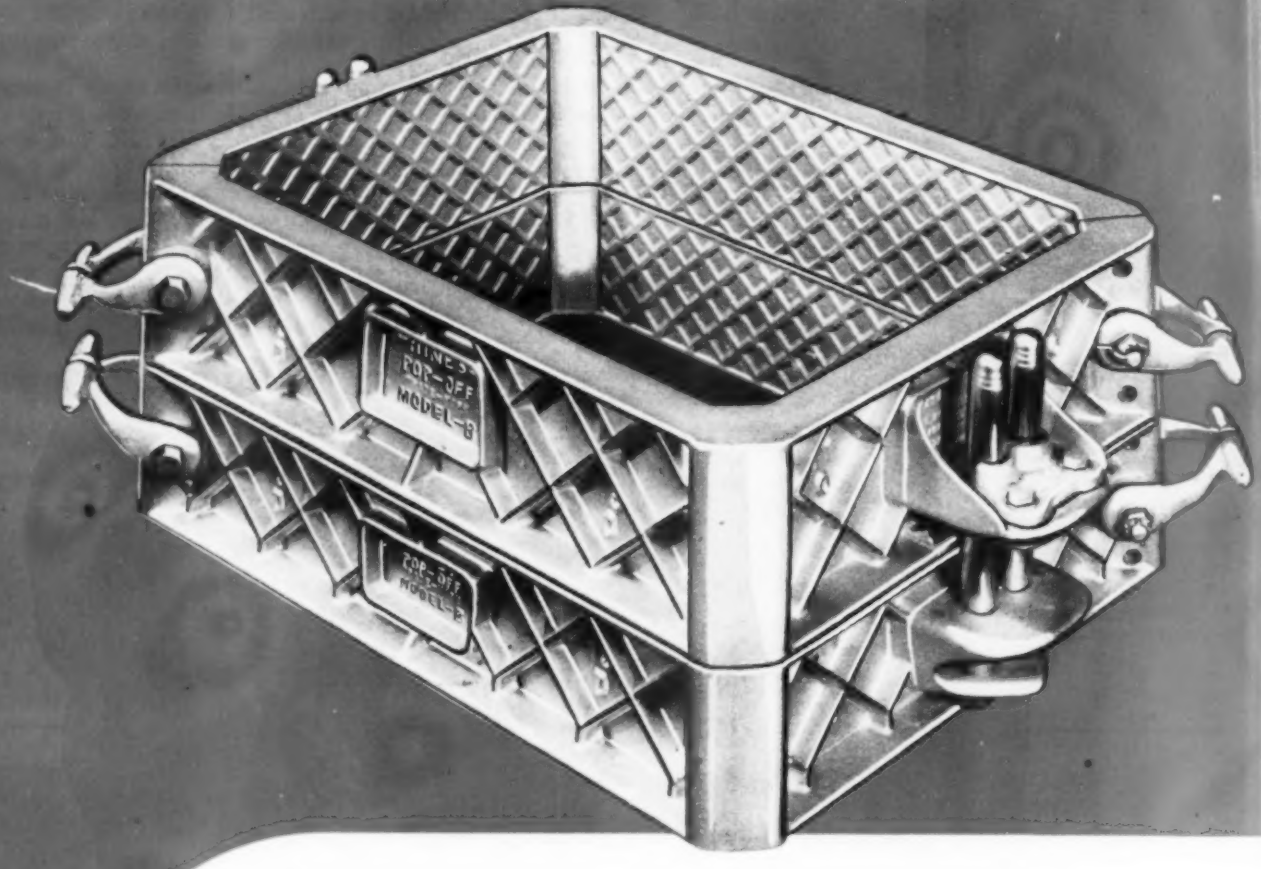
Watch for further details. For additional information write Fisher Furnace Division, Lindberg Engineering Company, 2453 West Hubbard St., Chicago 12,

LINDBERG FURNACES

Hines Model "B"

ALUMINUM POP-OFF FLASK

for high production on light squeezers



HINES
POP-OFF
(Tradcmark Reg. U. S. Pat. Off.)
FLASK

The LIGHTER WEIGHT M

This illustration of the Hines Model "B" Aluminum Pop-Off Flask is a good picture of a good product—but many of its important points can't be *seen*. Some of these points are LIGHT WEIGHT, EXTREME DURABILITY, LOW PRICE, UTILITY and the fact that it will ELIMINATE SHIFTS. Hines Flasks are designed to "make the tough jobs easy"; they set a pattern for economical foundry operation.

FOR BEST RESULTS, USE HINES JACKET . . T

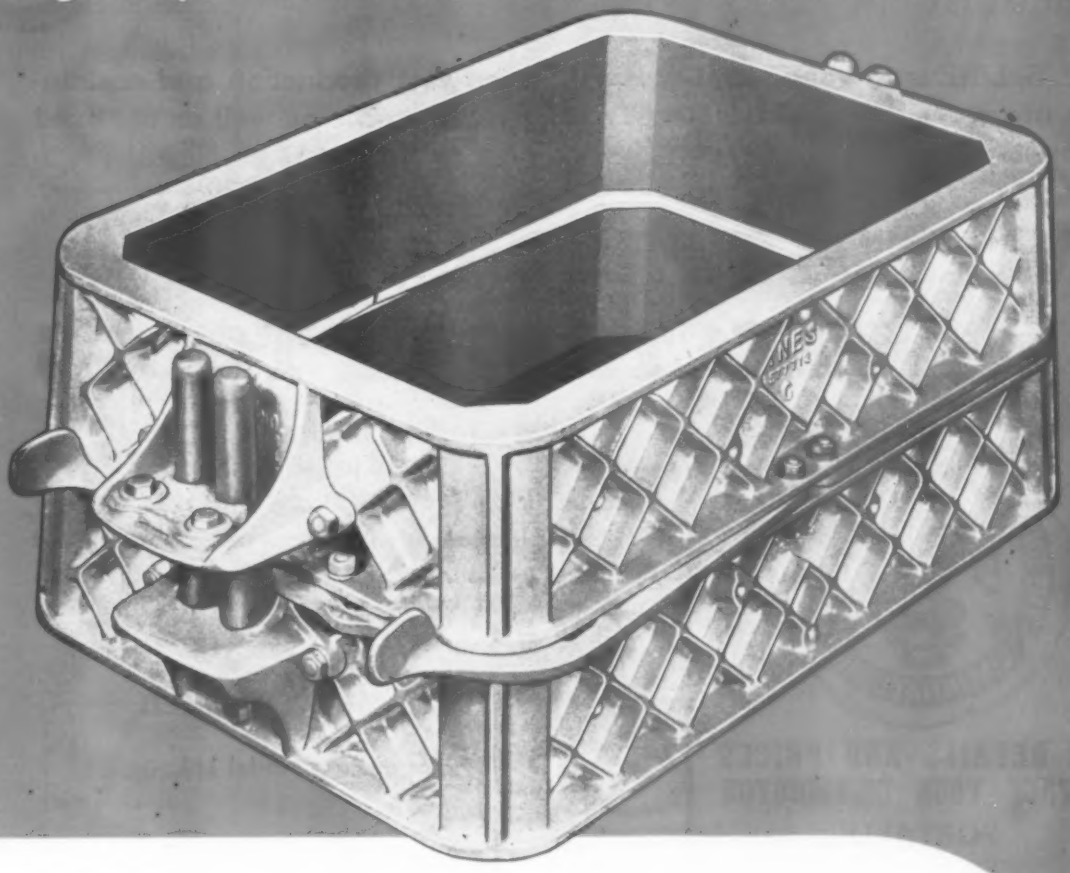
THE HINES F

3431 WEST 140th ST.

Hines Model "A"

ALUMINUM SLIP FLASK

for light squeezers . . . pattern casting . . . trade schools



METALLIC FLASKS

The Hines Model "A" Aluminum Slip Flask is particularly recommended for light squeezer work, pattern casting and for trade schools. It is much lighter in weight than the ordinary flask, making the molder's work that much easier. It costs less, outlasts other flasks, and reflects credit on an organization that has been exclusively a builder of flasks and jackets over a period of twenty-five years.

All Hines Flasks are fully protected by U. S. and Foreign Patents

. . THEY ALWAYS FIT THE MOLD SNUGLY

FLASK CO.

CLEVELAND 11, OHIO

TAKE THE TOOL TO THE WORK
BRING THE WORK TO THE TOOL

THE U. S. LINE is so varied and comprehensive that production and maintenance are served with satisfaction both by the portable as well as the fixed position items in

UNITED STATES ELECTRICAL TOOLS

THE UNITED STATES ELECTRICAL TOOL CO. OUR 50th YEAR CINCINNATI, OHIO

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And other tools

Ever since 1897 these tools have been an integral factor in the growth of industry . . . today they play an increasingly important part in present and future industrial planning. ***Let them serve you too.***

BUFFER AND POLISHER

Motor in base Model 110

For polishing and burnishing. Practical and economical: eliminates outlay in cycle changing equipment and waste in power transmission.

The UNITED STATES ELECTRICAL TOOL Co.
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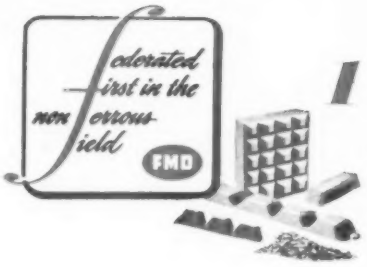
FOUR FEDERATED *firsts*

THAT SAVE FOUNDRY TIME AND TROUBLE



1 *first in* PRODUCT VARIETY

Brasses, bronzes, other copper alloys; deoxidizers, hardeners; alloys of aluminum, magnesium, zinc — you get them all from one source, first in the field — Federated Metals Division.

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2 *first in* UNIFORMITY

Federated metals and alloys . . . made in large-capacity furnaces, with strict lab control to meet Federated's nationally known specifications . . . are uniform in the analyses you need to cast quality products.

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3 *first in* TECHNICAL SERVICE

50 years' metallurgical experience, modern laboratory practice, and real foundry know-how . . . interpreted by practical service engineers to keep you informed of latest developments. And Federated's helpful literature tells what alloys to use, how to improve foundry practice.

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4 *first in* FACILITIES

Federated has 11 strategically located plants and 25 sales offices — all the facilities that make it easy for you to deal with an organization in your own area. Deliveries are faster, and there is always a friendly Federated office within easy telephone radius.

When you specify non-ferrous ingot, be sure you get the best . . . with the helpful experience of the first in the field. For quality metal, and service that helps in the foundry, call or write the Federated office nearest you. *Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, New York.*

Federated METALS DIVISION

AMERICAN SMELTING AND REFINING COMPANY

You weigh the Iron...
You weigh the Coke...

I-R MOTORBLOWERS weigh the Air

By weighing the air accurately and automatically I-R Motorblowers with constant air-weight control will assure every foundry of uniformly hot iron from every heat. Of the hundreds of foundries using I-R motorblowers many have increased spout temperatures. Others have increased the melting rate. Still others have cut down on coke consumption without changing spout temperatures or melting rate.

If you are not already using air-weight control let us send you Bulletin No. 2145-A. It explains in detail how the Motorblower will give you the above advantages, and help you get better castings and fewer rejects.

IR

ROCK DRILLS
AIR COMPRESSORS
OIL ENGINES
AIR TOOLS
PUMPS

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THE FURNACE THAT KEEPS PRODUCTION *spinning*

Centrifugal casting, because it eliminates machining, reduces rejects, and improves physical properties of metals, is a vital new process. And Ajax-Northrup high-frequency melting is vital to successful centrifugal casting.

The Ajax-Northrup furnace melts in minutes—no chance for contamination or oxidation. Uniform alloys—it stirs as it melts. Exact pouring temperatures. Excellent scrap recovery.

Capacities from 8 oz. to 50 lbs. with converter power source, and from 10 lbs. to several tons with motor-generator power source. Linings to suit all alloys, and furnaces are easily interchangeable for handling a variety. Write Ajax for more facts.

Send for Bulletin 27

106

AJAX NORTHRUP SINCE 1916

AJAX ELECTROTHERMIC CORP.
AJAX PARK, TRENTON 5, N. J.

ASSOCIATE COMPANIES
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AJAX ELECTRIC FURNACE CORP. • AJAX ENGINEERING CORP.

HIGH-FREQUENCY HEATING-MELTING

It's a "Cost-Compressor," too!

The Worthington YC Saves You Money In Every Detail of Installation and Operation

Installation Savings

- Takes ½ the building space and ¼ the foundation space of same capacity horizontals.
- Comes assembled; needs no alignment, special clamps or erecting engineer.
- Needs only power and air connections to put it to work.
- Quickly and easily installed, even where subsoil is poor.
- Lighter weight reduces transportation charges.

Operation Savings

- Perfectly balanced Y-frame for higher rpm cuts motor costs.
- Specially designed bearings and rods eliminate ordinary wedge-adjustments.
- Outside valves, large openings, easy-to-reach parts allow quick inspection.
- Spare parts smaller and less expensive.
- Worthington Feather* Valves are the lightest, most efficient, most economical ever made.

Another big advantage of YC's is their adaptability to many drives — Multi-V-Drive, coupled drive from explosion-proof motor, steam turbine, or practically any type of rotative power. Still another is the instantly responsive, power-saving, 3- and 5-step *variable capacity control* . . . From start to finish you'll pay less for air with these rugged, long-lived, cooler and smoother running Worthington YC Compressors.

Write for Literature

Bulletin L-667-B1A will give you the whole story . . . and further proof that *there's more worth in Worthington. Worthington Pump and Machinery Corporation, Compressor Division, Buffalo, New York.*

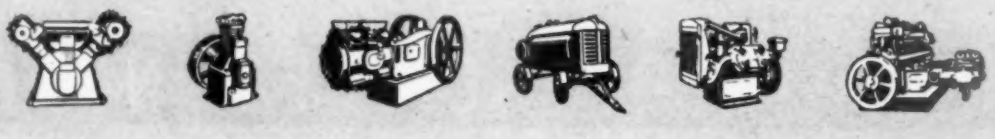
WORTHINGTON

NO OTHER COMPRESSOR WILL OUTPERFORM A WORTHINGTON

*Reg. U. S. Pat. Off.

K7-2

Y-Types | Vertical | Horizontal | Portable | Radial | Gas-Engine Compressors



NONE BETTER

MELTRITE

PIG IRON

Exactly What the Name Implies

More USED than Any Other
Merchant PIG IRON—

Such Preference Must Be Merited

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PICKANDS MATHER & COMPANY

CLEVELAND • CHICAGO • ST. LOUIS • ERIE
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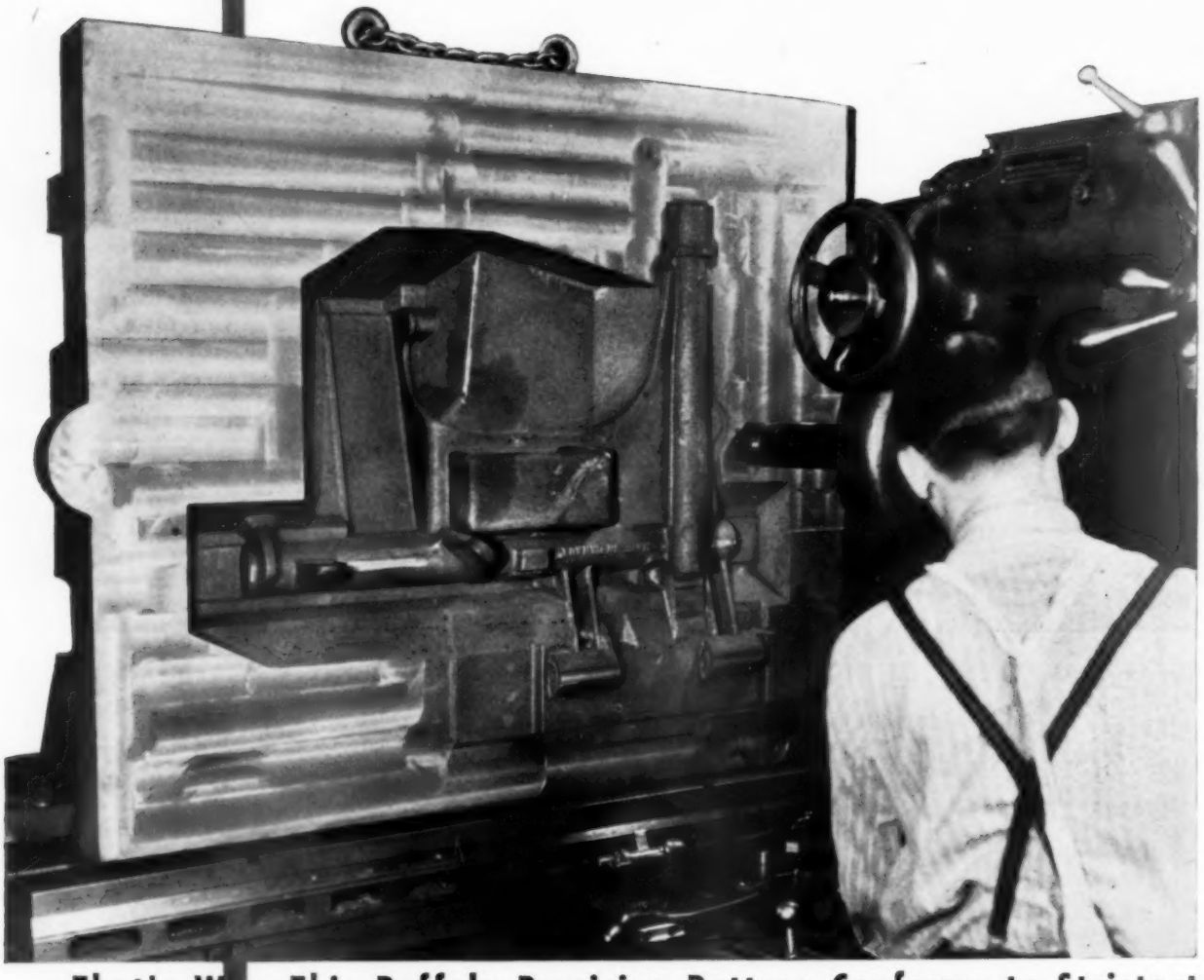
IRON ORE • PIG IRON • COAL • COKE

An ounce of PRECISION

-SAVES-POUNDS OF-CASTING-LOSSES



That's Why This Buffalo Precision Pattern Conforms to Strictest Requirements for Dimensional Accuracy and Structural Soundness

"We want castings that are so accurate we can minimize machining and eliminate scrap. Further, we want this pattern tough enough to allow high speed production of these castings through use of a SAND SLINGER." In effect, this is what a large manufacturer requested when he set us to work on this large pattern. (The cope alone weighs ¾ of a ton.)

Here's how we handled the problem: (1) Made the pattern out of Meehanite for strength, (2) Used our fifty-five years of "know how", plus our modern facilities to make every contact point dimensionally accurate to thousandths of an inch. Here you see the cope being machined all over, the last in a long series of steps to insure this accuracy.

Consider the increased production benefits you can enjoy too, if you engage Buffalo Pattern Works to "precision make" your next pattern. We're as near as your phone. RI. 3512, Buffalo, N. Y.

BUFFALO PATTERN WORKS

830 Hertel Avenue Buffalo, N. Y

MORE BIG NEWS ABOUT MACHINE TOOLS

29 TYPES ADDED TO WAA LIST OF FIXED PRICE TOOLS

New fixed price policy now applies to a total of 60 important types and makes of general purpose tools. See the next 3 pages for details of this *high speed* sales program.

GOVERNMENT WAA SURPLUS

Floor Grinders—With Wheels over 6" Diameter and Driving Motors Other Than 110 Volt.

Boring Machine—Horizontal, Precision, Bridge Type, Single and Double End.

Chucking Machine—Bullard Mul-au-Matic Vertical, Multiple Spindle Type.

Chucking Machine—Six Spindle Automatic, Horizontal.

Drilling Machines—Deep Hole, Pratt and Whitney.

Drilling and Tapping Machine—Multiple Spindle Automatic.

Drilling Machine—Multiple Spindle, Fixed Center-Drills, Natco.

Gear Tooth Grinder—For Spur Gears, External and Internal (Formed Wheel Type Machine).

Gear Tooth Lapper—External and/or Internal Gear Tooth Lapping Machine.

Gear Tooth Shaver—Rack or Rotary Type, External or Internal Gear Shaver.

Contour Cutter Grinder.

Grinders, Cam and Crank Pin.

Grinders, Miscellaneous—Spline and Radius Grinders.

Lapping Machines—Flat, Norton Hydrolap.

Lathes, Production—Between Centers Automatic, Horizontal Single Spindle.

Slot Milling Machine.

Milling Machine—Spline.

Milling Machine—Bed Type, Vertical.

Planer—Craven Bros.

Screw Machine—Multiple Spindle Bar Type Automatic.

Vertical Shapers and Slotters.

Speed Lathes—All Types and Sizes.

The following types of tools were originally repriced on October 1st. They are listed again because additional makes and models have been put on the new fixed price schedule.

Gear Hobber—Horizontal.

Gear Hobber—Vertical, Muir.

Gear Tooth Grinder—Generating Type, For Spur and Helical Gears.

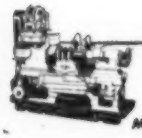
Milling Machine—Bed Type, Horizontal Spindle, Plain or Rise and Fall, Simplex or Duplex.

Milling Machine—Vertical, Knee Type Except Bench Models.

Tapping Machine—Vertical, Single or Multiple Spindle.

bargains like this ready for IMMEDIATE DELIVERY

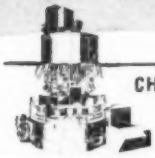
GOVERNMENT WAA SURPLUS



LATHES, PRODUCTION—BETWEEN CENTERS AUTOMATIC, HORIZONTAL SINGLE SPINDLE

Manufacturer: JONES AND LAMSON MACHINE CO., SPRINGFIELD, VT.

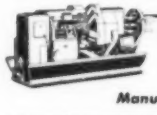
MODEL	SIZE AND CAPACITY	SALES PRICE
8" Fay Automatic	8" swing x 21" center to center	$ 796.00
8" Fay Automatic	8" swing x 33" center to center	843.00
8" Fay Automatic	8" swing x 45" center to center	889.00
12" Fay Automatic	12" swing x 21" center to center	$1195.00
12" Fay Automatic	12" swing x 33" center to center	1261.00
12" Fay Automatic	12" swing x 45" center to center	1330.00
12" Fay Automatic	12" swing x 63" center to center	1465.00
12" Fay Automatic	12" swing x 81" center to center	1636.00
16" Fay Automatic	16" swing x 21" center to center	$2079.00
16" Fay Automatic	16" swing x 33" center to center	2148.00
16" Fay Automatic	16" swing x 51" center to center	2284.00
20" Fay Automatic	20" swing x 25" center to center	$1569.00
20" Fay Automatic	20" swing x 37" center to center	1638.00
24" Fay Automatic	24" swing x 69" center to center	2717.00
Manufacturer: LODGE AND SHIPLEY MACHINE TOOL COMPANY, CINCINNATI, OHIO		
No. 1 "Duomatic"	16" swing over bed, 10" over slides, 39" centers	$1078.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 15" centers	1772.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 27" centers	1826.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 39" centers	1879.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 51" centers	1932.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 63" centers	1986.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 75" centers	2039.00
Manufacturer: SENECA FALLS MACHINE COMPANY, SENECA FALLS, N. Y.		
IMP Lo-Swing	4-1/2" swing over front and rear carriage, 8" centers	$ 746.00
IMP Lo-Swing	4-1/2" swing over front and rear carriage, 12" centers	769.00
LR Lo-Swing	5-1/2" swing over front and rear carriage, 10" centers	768.00
LR Lo-Swing	5-1/2" swing over front and rear carriage, 16" centers	815.00
LR Lo-Swing	5-1/2" swing over front and rear carriage, 22" centers	$ 854.00
LR Lo-Swing	5-1/2" swing over front and rear carriage, 34" centers	965.00
LR Lo-Swing	5-1/2" swing over front and rear carriage, 46" centers	1021.00
R-14 Lo-Swing	11-1/2" swing over front and rear carriage, 34" centers	2627.00
Manufacturer: SUNDSTRAND MACHINE TOOL COMPANY, ROCKFORD, ILL.		
8 Automatic Lathe	8" swing x 15" center to center	$ 715.00
8 Automatic Lathe	8" swing x 21" center to center	757.00
8 Automatic Lathe	8" swing x 28" center to center	816.00
10 Automatic Lathe	12" swing x 16" center to center	$ 976.00
10 Automatic Lathe	10" swing x 22" center to center	1020.00
10 Automatic Lathe	10" swing x 34" center to center	1128.00
10 Automatic Lathe	10" swing x 46" center to center	1242.00
12 Automatic Lathe	12" swing x 22" center to center	$1126.00
12 Automatic Lathe	12" swing x 34" center to center	1233.00
12 Automatic Lathe	12" swing x 46" center to center	1349.00
15 Automatic Lathe	15" swing x 22" center to center	$1102.00



CHUCKING MACHINE—AUTOMATIC, VERTICAL, MULTIPLE SPINDLE TYPE

Manufacturer: BULLARD COMPANY, BRIDGEPORT, CONN.

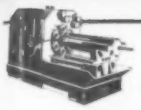
MODEL	SIZE AND CAPACITY	SALES PRICE
D "Mult-au-Matic"	34" swing 4 spindle	$19393.00
D "Mult-au-Matic"	8" swing 6 spindle	6136.00
D "Mult-au-Matic"	12" swing 6 spindle	6506.00
F "Mult-au-Matic"	7" swing 12 spindle	6380.00



SCREW MACHINE—SINGLE AND MULTIPLE SPINDLE BAR TYPE AUTOMATIC

Manufacturer: CONE AUTOMATIC MACHINE COMPANY, WINDSOR, VT.

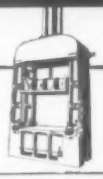
MODEL	SIZE AND CAPACITY	SALES PRICE
SK Automatic Screw Machine	1-1/2" diameter bar capacity, 6 spindle	$3066.00
SN Automatic Screw Machine	2" diameter bar capacity, 6 spindle	3307.00
SD Automatic Screw Machine	2-1/4" diameter bar capacity, 6 spindle	3446.00
SE Automatic Screw Machine	2-5/8" diameter bar capacity, 6 spindle	3932.00
SF Automatic Screw Machine	3-1/2" diameter bar capacity, 6 spindle	4432.00
WW Automatic Screw Machine	1-1/2" diameter bar capacity, 8 spindle	$3065.00
XX Automatic Screw Machine	1-7/8" diameter bar capacity, 8 spindle	3132.00
DD Automatic Screw Machine	1-1/2" diameter bar capacity, 8 spindle	2360.00
VB Automatic Screw Machine	1-5/8" diameter bar capacity, 8 spindle	3132.00
MM Automatic Screw Machine	1-7/8" diameter bar capacity, 8 spindle	2529.00
Manufacturer: GREENLEE BROTHERS AND COMPANY, ROCKFORD, ILL.		
1" Automatic Screw Machine	1" diameter bar capacity, 6 spindle	$2216.00
1-5/8" Automatic Screw Machine	1-5/8" diameter bar capacity, 6 spindle	2636.00
2" Automatic Screw Machine	2" diameter bar capacity, 6 spindle	3269.00
Manufacturer: THE NATIONAL ACME COMPANY, CLEVELAND, OHIO		
3/8" R-6 Automatic Screw Machine	3/8" diameter bar capacity, 6 spindle	$2105.00
9/16" RA-6 Automatic Screw Machine	9/16" diameter bar capacity, 6 spindle	1602.00
1" RA-6 Automatic Screw Machine	1" diameter bar capacity, 6 spindle	3036.00
1-1/4" RA-6 Automatic Screw Machine	1-1/4" diameter bar capacity, 6 spindle	3465.00
1-5/8" RA-6 Automatic Screw Machine	1-5/8" diameter bar capacity, 6 spindle	$4118.00
1-5/8" RB-6 Automatic Screw Machine	1-5/8" diameter bar capacity, 6 spindle	4118.00
2" RA-6 Automatic Screw Machine	2" diameter bar capacity, 6 spindle	4350.00
2" RB-6 Automatic Screw Machine	2" diameter bar capacity, 6 spindle	4350.00
2" RAS-6 Automatic Screw Machine	2" diameter bar capacity, 6 spindle	$4350.00
2-5/8" RA-6 Automatic Screw Machine	2-5/8" diameter bar capacity, 6 spindle	4969.00
2-5/8" RB-6 Automatic Screw Machine	2-5/8" diameter bar capacity, 6 spindle	4969.00
3-1/2" RA-6 Automatic Screw Machine	3-1/2" diameter bar capacity, 6 spindle	5781.00
Manufacturer: NEW BRITAIN-GRIDLEY MACHINE COMPANY, NEW BRITAIN, CONN.		
00 Automatic Screw Machine	5/8" diameter bar capacity, 6 spindle	$1778.00
00A Automatic Screw Machine	5/8" diameter bar capacity, 6 spindle	1059.00
00 Automatic Screw Machine	1" diameter bar capacity, 6 spindle	2741.00
01 Automatic Screw Machine	1-3/8" diameter bar capacity, 6 spindle	$3299.00
01 Automatic Screw Machine	1-5/8" diameter bar capacity, 6 spindle	3373.00
01 Automatic Screw Machine	2" diameter bar capacity, 6 spindle	3560.00
01 Automatic Screw Machine	2-1/4" diameter bar capacity, 6 spindle	3662.00



CHUCKING MACHINE—SIX SPINDLE AUTOMATIC, HORIZONTAL

Manufacturer: NEW BRITAIN-GRIDLEY MACHINE COMPANY, NEW BRITAIN, CONN.

MODEL	SIZE AND CAPACITY	SALES PRICE
652 Automatic, Work Rotating Chucker	2" swing	$2682.00
654 Automatic, Work Rotating Chucker	3-1/2" swing	2885.00
65 Automatic, Work Rotating Chucker	5-3/4" swing	5058.00
665 Automatic, Work Rotating Chucker	6-1/2" swing	5139.00
675 Automatic, Work Rotating Chucker	7-1/2" swing	$5313.00
16 Automatic, Work Rotating Chucker	9" swing	4863.00
16 Automatic, Work Rotating Chucker	10-1/4" swing	5458.00
656 Automatic, Work Rotating Chucker	5-3/4" swing	5058.00
Manufacturer: THE BAIRD MACHINE COMPANY, BRIDGEPORT, CONN.		
76H Automatic, Work Rotating Chucker	7" swing	$3880.00



FORGING MACHINERY AND HAMMERS—IMPACT STAMPING TYPE

Manufacturer: CHAMBERSBURG ENGINEERING COMPANY, CHAMBERSBURG, PA.

MODEL	SIZE AND CAPACITY	SALES PRICE
Elpc Coco Stamp	30" R to L, 24" F to B, 36" stroke	$1343.00
Elpace Coco Stamp	48" R to L, 36" F to B, 42" stroke	2074.00
Elplain Coco Stamp	48" R to L, 48" F to B, 42" stroke	2455.00
Elpoint Coco Stamp	66" R to L, 36" F to B, 48" stroke	2471.00
Elplank Coco Stamp	66" R to L, 48" F to B, 48" stroke	$3684.00
Elplanet Coco Stamp	66" R to L, 60" F to B, 48" stroke	3896.00
Elpale Coco Stamp	96" R to L, 48" F to B, 48" stroke	3922.00
Elpublic Coco Stamp	90" R to L, 60" F to B, 48" stroke	4642.00

25%

OR MORE BELOW USED MARKET

— purchasing can be done either directly with the 33 WAA Regional Offices or with one of the 3,000 "approved" dealers.

— one low price everywhere — any regional office, dealer or site sale.

— no waiting for priorities, complicated figuring of prices or other delays.

MILLING MACHINE—BED TYPE, HORIZONTAL SPINDLE PLAIN OR RISE AND FALL, SIMPLEX OR DUPLEX

Manufacturer: BROWN AND SHARPE MFG. CO., PROVIDENCE, R. I.

MODEL	SIZE AND CAPACITY	SALES PRICE
000 Plain (Simplex)	6" table travel x 8" width	$ 394.00
10 Plain, Electrically Controlled (Simplex)	12" table travel x 10" width	789.00
12 Plain, Electrically Controlled (Simplex)	18" table travel x 12" width	969.00
12 Plain, Electrically Controlled (Simplex)	24" table travel x 12" width	1009.00
Manufacturer: CINCINNATI MILLING AND GRINDING MACHINES, INC., CINCINNATI, O.		
34-36 Plain, Hydromatic	36" table travel x 16" table width	$1550.00
35-48 Plain, Hydromatic	48" table travel x 20" table width	1918.00
56-90 Plain, Hydromatic	90" table travel x 24" table width	2807.00
4-36 Duplex, Hydromatic	36" table travel x 16" table width	2471.00
Manufacturer: KEARNEY AND TRECKER CORPORATION, MILWAUKEE, WIS.		
1218 Automatic, Simplex	18" table travel x 12" table width	$1206.00
1842 Automatic, Simplex	42" table travel x 18" table width	1623.00
1854 Automatic, Simplex	54" table travel x 18" table width	1662.00
Manufacturer: KENT-OWENS MACHINE COMPANY, TOLEDO, OHIO		
1-B Plain, Hydraulic, Single Spindle	8" table travel x 9" width	$ 454.00
2-20-DS Plain, Hydraulic, Double Spindle	20" table travel x 12" width	1433.00

DRILLING MACHINE—MULTIPLE SPINDLE WITH CENTRAL DRIVING UNIT

Manufacturer: NATIONAL AUTOMATIC TOOL CO., INC., RICHMOND, IND.

These prices apply only to exact model listed and cover types with nonadjustable fixed center drill spindle or spindles which are all driven by a separate motor mounted directly above spindle gear box and moving vertically with the gear box.

MODEL AND DESCRIPTION	SALES PRICE
Mod. B-2A Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	$1417.00
Mod. B-3A Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	1780.00
Mod. B-4A Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	2196.00
Mod. B-5A Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	4052.00
Mod. 2-AL Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	$1417.00
Mod. 3-AL Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	1780.00
Mod. 4-AL Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	2196.00
Mod. 5-AL Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	4052.00
Mod. 2-AH Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	$1417.00
Mod. 3-AH Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	1780.00

The above prices do not apply to general purpose adjustable Multi-Spindle Natco drilling machines equipped with slip spindle plates or with standard adjustable spindles.

ALL TOOLS SUBJECT TO PRIOR SALE

Get this new catalog list

If you can use any of the 29 additional types of production tools on which fixed prices have been established, send today for WAA's new (January 15) Fixed Price Machine Tool Catalog giving all sizes and new fixed prices.

PLUS—Catalog of sizes, models and prices of 31 types of production tools previously (October 15) placed on the fixed price list. For copies of one or both of these catalogs, simply write, phone or wire the nearest WAA office listed on the 4th page of this advertisement.

EXPORTERS: Your business is solicited. Much material which is surplus in the United States is urgently needed or is readily saleable in other countries. Watch for other offerings; many of them may be of interest to your clients.

WAR ASSETS ADMINISTRATION

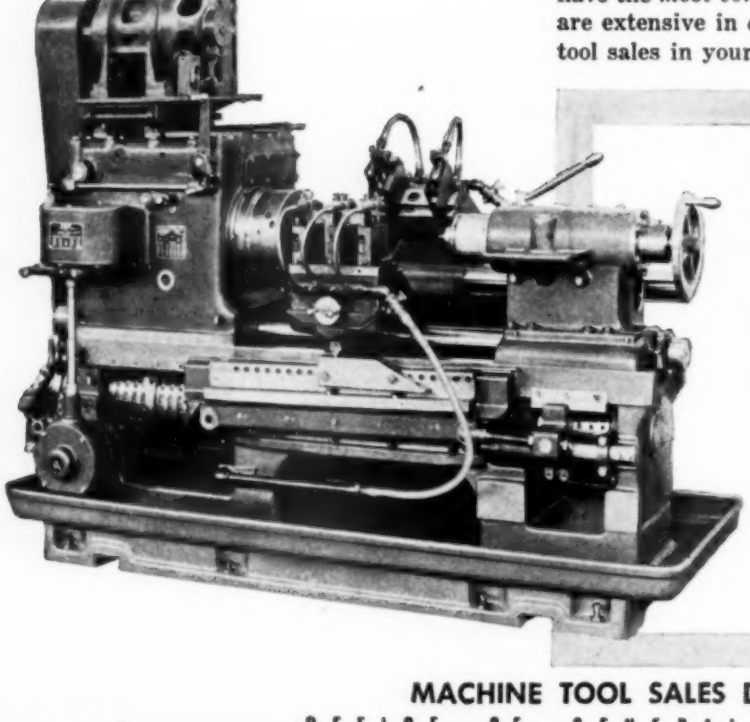
GOVERNMENT WAA SURPLUS

One Call ...

TO BUY AND GET DELIVERY

To purchase the machine tools you need, visit any of the WAA offices listed below, your regular machine tool dealer, or any WAA Machine Tool Site Sale advertised in your local paper. You can arrange *on the spot* for immediate delivery. Shipping time must be allowed for, however, when the particular machine you want is located elsewhere. But you will not have to wait for lengthy clearances of priorities or nation-wide search of stocks. All machines are available for immediate sale.

There is a WAA office near you — Offices listed below with a star have the *most complete* inventories of surplus machine tools—but stocks are extensive in *all* offices. Watch your newspaper for special machine tool sales in your area.



HOW NEW PRICE POLICY WORKS

New prices take into consideration the estimated cost of engineering and rebuilding the tools. For example:

Here is how WAA's new price has been set on a 20 inch Fay Automatic Production Lathe, 37" center to center, a Jones and Lamson machine. WAA code No. 3416-61-62-57.

Price (New)	$7,059.00
Previous WAA Sales Price (based on depreciation primarily)	3,529.00
Average Market Value	2,130.00
New WAA Fixed Sales Price	1,638.00
Available for Rebuilding	$ 492.00

MACHINE TOOL SALES DIVISION

OFFICE OF GENERAL DISPOSAL

WAR ASSETS ADMINISTRATION

GOVERNMENT WAA SURPLUS

Offices located at: Atlanta • Birmingham • *Boston • Charlotte • *Chicago • Cincinnati • *Cleveland Denver • *Detroit • Grand Prairie, Tex. • Helena • Houston • Jacksonville • Kansas City, Mo. Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • *New York • Omaha • *Philadelphia Portland, Ore. • Richmond • Salt Lake City • *St. Louis • San Antonio • San Francisco • Seattle • Spokane • Tulsa

686-S

Men Feel Better—Work Better

in Improved

FOUNDRY GOGGLES

With worry off their mind, comfort on their nose and the safety over their eyes that improved N. F. A. Goggles *assure,* ladlemen can do a better job.

There's *added* comfort in the corduroy binding which borders the entire pliable leather mask — providing a snug, safe fit without constriction. Fitting is simplified with these improved goggles which are available in *two* sizes. The one-piece rubber headband won't slip and is easily adjustable. Wire screen ventilators let in air, keep out foreign particles — help prevent lenses from fogging.

Wherever high impact hazards are a threat, these goggles provide peak protection. Available with 50 mm. Super Armorplate or 6 Curve Super Armorplate clear or Calobar lenses in medium, dark or extra dark shades. Your AO Safety Representative can supply you.

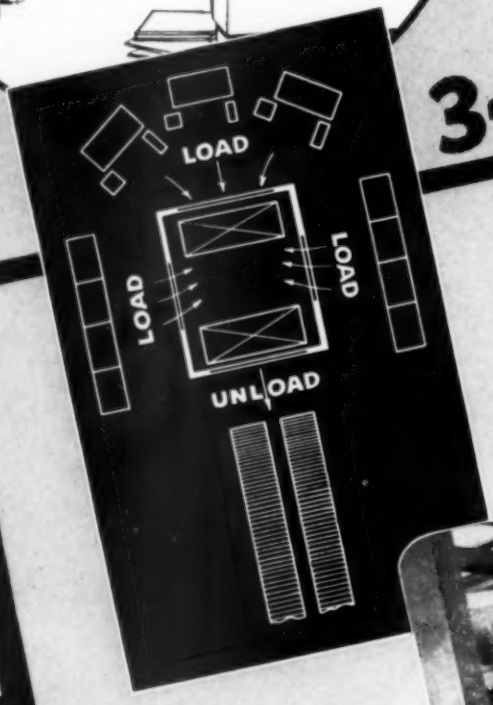
Safety Division American Optical COMPANY

SOUTHBRIDGE, MASSACHUSETTS. BRANCHES IN PRINCIPAL CITIES

ONLY COLEMAN T

OFFER *These* E

3-SIDE LOADING



Only the Patented Open Center makes possible the efficient grouping of coremakers around 3 sides of the Tower and increases loading accessibility up to 300% compared with ordinary vertical oven design.

COLEMAN TOWER OVENS in gray iron jobbing foundry. Many similar installations in malleable, steel, aluminum and magnesium foundries.

COLEMAN
CORE *and* MOLD
OVENS

The **FOUNDRY**
CLEVELAND 13,

BUILDERS OF COLEMAN

TOWER OVENS
EXCLUSIVE FEATURES

To get the most out of modern continuous baking with vertical core ovens, you must have the advantages offered by the exclusive features of Coleman Tower Ovens.

FAST LOADING. Patented Open Center makes them by far the fastest loading vertical ovens built.

PERFECT BAKING AT AMAZING SPEEDS. Perfect core baking eliminates rejects and make-overs.

LARGE LABOR SAVING. The efficient grouping of coremakers made possible by the Patented Open Center greatly increases man-power productivity and reduces indirect labor to a mere fraction.

RECUPERATIVE COOLING. Cores are cooled before reaching the unloading position and the recovered heat is used over again, resulting in *big fuel saving.*

BETTER WORKING CONDITIONS. With the cores cooled and "smoked-off" before unloading there are no acrid fumes or gases nor uncomfortable heat in the core department. Better conditions increase output.

LARGE OUTPUT FROM SMALL FLOOR SPACE. In Coleman Tower Ovens all the baking is done overhead, giving you large core-baking capacity from very little floor space.

These and many other features are responsible for the wonderful record of performance of Coleman Tower Core Ovens in outstanding foundries producing all types of castings.

Coleman Ovens are also built in all conventional and special designs to meet every possible requirement in core baking and mold drying. Heating systems can be furnished to use the most economical fuel available in your locality—gas, oil, electricity, powdered coal, stoker coal, etc.

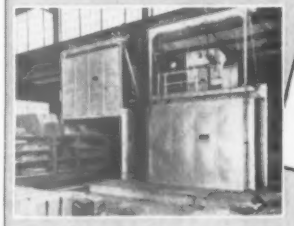
WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS. 9,000 SUCCESSFUL INSTALLATIONS.

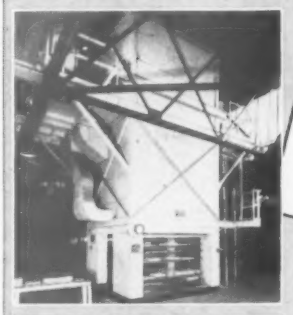
Write for Folio of Bulletins

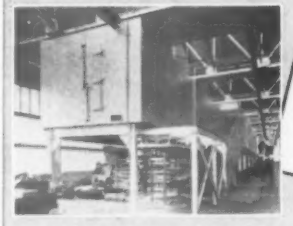
COLEMAN Portable Core Ovens

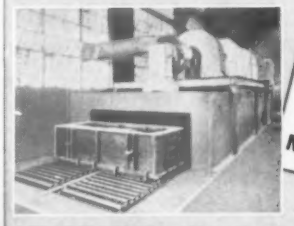
COLEMAN Rolling Drawer Ovens

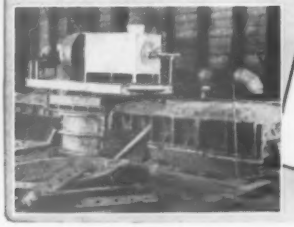
COLEMAN Transrack Ovens


COLEMAN Car Type Ovens


COLEMAN Tower Ovens


COLEMAN Horizontal Conveyor Ovens


COLEMAN Conveyor Mold Ovens

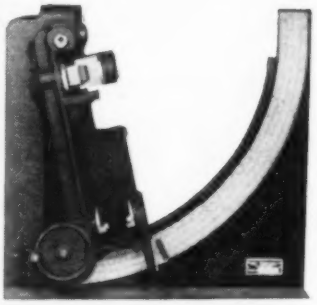

COLEMAN Portable Mold Dryers

Y EQUIPMENT Company
13, OHIO, U. S. A.
AN ND SWARTWOUT OVENS

MEMBER

FOUNDRY CONTROL AND LABORATORY EQUIPMENT

SAND STRENGTH MACHINE



The Universal Sand Strength Machine is versatile, accurate, sturdy and economical for testing deformation, shear, compression, tension both green and dry, paste and the tensile strength of baked cores.

MOISTURE TELLER

By forcing heated air (above steaming temperature) through any porous material such as sand, the Moisture Teller flash-dries the sample. From the resulting loss of weight, percentage of moisture is accurately determined. The Moisture Teller is used both in the shop and in the laboratory.

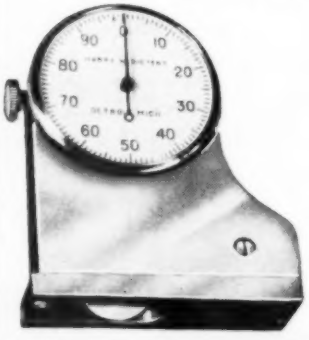
MOLD HARDNESS TESTER

This is a pocket tool to measure the hardness of green oil sand cores and green sand molds in order to regulate the amount of ramming and, therefore, the proper hardness for acceptable castings.

SAND RAMMER

The No. 315 Sand Rammer furnishes a durable laboratory tool for ramming A. F. A. sand specimen with a high degree of reproductability. The No. 314 Plunger Raising Device, No. 305 Specimen Tube of hardened steel and the No. 830 Flowability Indicator are available as accessories for all Sand Rammers.

CORE AND DRY SAND HARDNESS

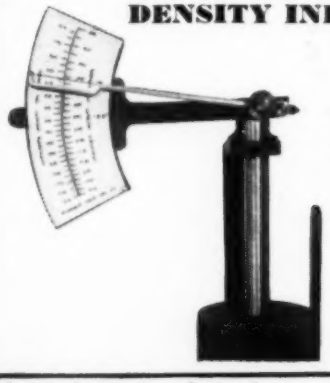


The No. 670 Core Hardness Tester enables foundrymen to measure the scratch or indentation hardness of cores or dry sand molds. Since hardness is a good measure of resistance to surface scuffing and strength, the Core Hardness Tester has become a good foundry control tool.

PERMEABILITY METER

The Permeability Meter quickly and accurately determines permeability of sands, green, dry and sharp—also core washes.

DENSITY INDICATOR



The foundryman has been accustomed to judging the weight of foundry sand by feeling a handful. The No. 850 Density Indicator mounted on the Sand Rammer enables him to determine the exact weight of a cubic foot of sand when rammed to a selected mold hardness.

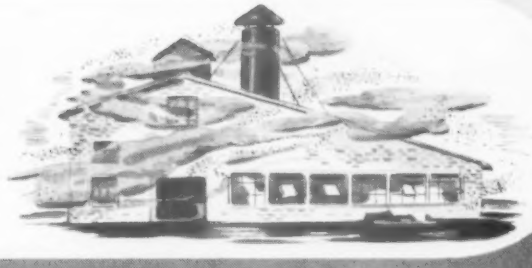
Write for prices and any further information desired.

Harry W. Dietert Company

DIETERT SAND MOLD CONTROL MOISTURE SULFUR CARBON EQUIPMENT

9330 ROSELAWN AVE. • DETROIT 4, MICHIGAN

Converts Dust



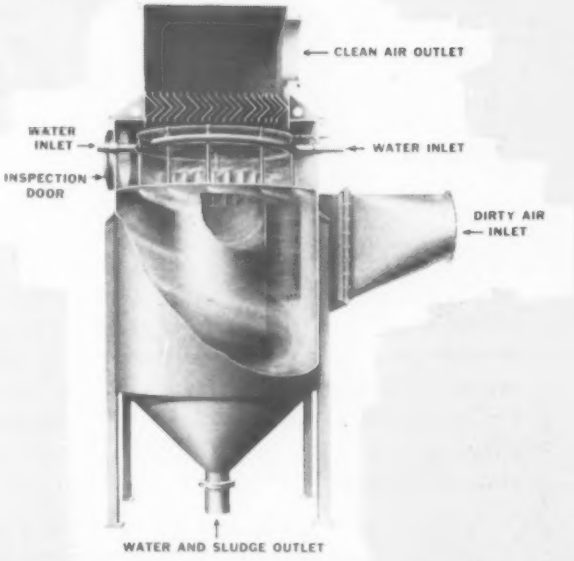
to Harmless Sludge

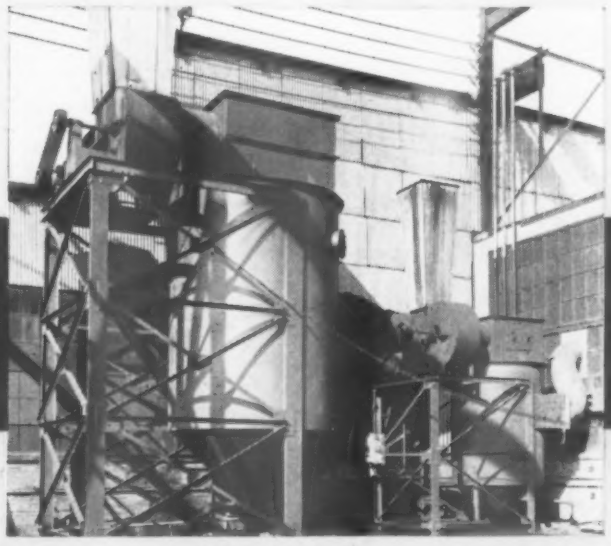
Whiting Hydro-Clone suppresses foundry dust by converting it into easily disposable sludge. At the same time, it removes obnoxious gases and dangerous fumes.

The operating principle of the Hydro-Clone is illustrated at right. Note how heavy dust is trapped by high velocity impingement against the copiously wetted surfaces of the precleaner section. The fine dust is then removed in an axial tube and disintegrator section.

This patented Hydro-Clone process removes up to 99.6% of the dust and soluble gases . . . protects workers' health and improves working conditions. Hydro-Clone has no moving parts, screens, cloth bags, or filters. All water used is recirculated.

Hydro-Clone Equipment is available in various capacities, and is adapted to the needs of the individual foundry. Write for Bulletin FY-109.



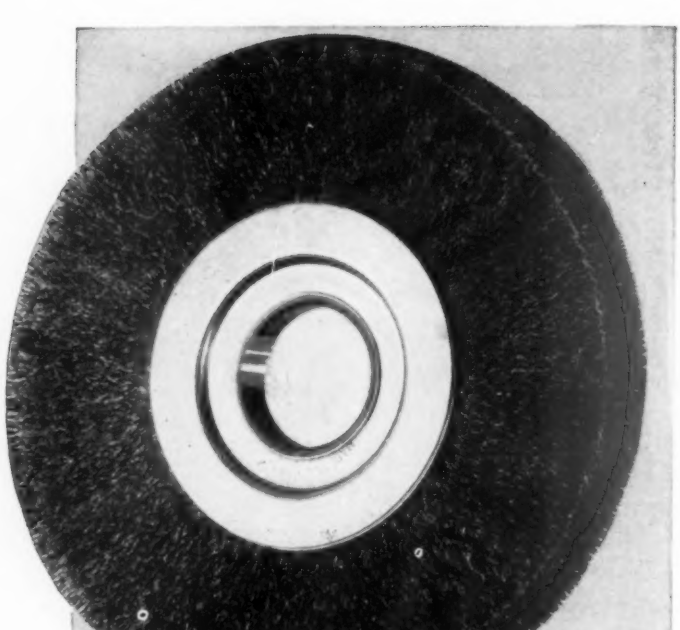


Hydro-Clones in foundry service.

WHITING CORPORATION

15607 Lathrop Ave., Harvey, Illinois

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco, and Washington, D. C. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, New York.



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WITH EXTRA

L-O-N-G L-I-F-E

AND ECONOMY

Thor WIRE WHEEL BRUSHES

IMMEDIATE DELIVERY FROM DISTRIBUTORS STOCKS

Firmly anchored to the core by a patented, strength-adding process, the Double-Durable special crimp wire which fills Thor Wire Wheel Brushes has above-average resistance to crystallization and breakage. It holds its strength longer for continued efficiency in cleaning, de-burring, roughing and burnishing. Used on portable or stationary equipment with spindle speeds up to 6000 r.p.m., these Thor brushes do better work with maximum economy.

Made in sizes from 4″ to 12″ diameter, with wire from 30 to 36 gauge, Thor brushes are available in single-unit, arbor-hole adaptor or metal-center sectional types. A new Thor folder, No. 538, makes selection of the proper brushes for your jobs simple. Write for your FREE copy . . . today.

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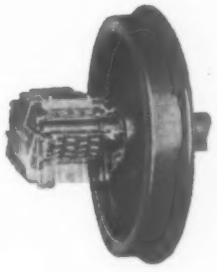
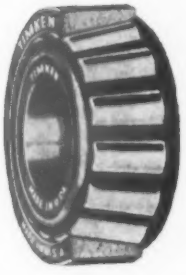
PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

TIMKEN

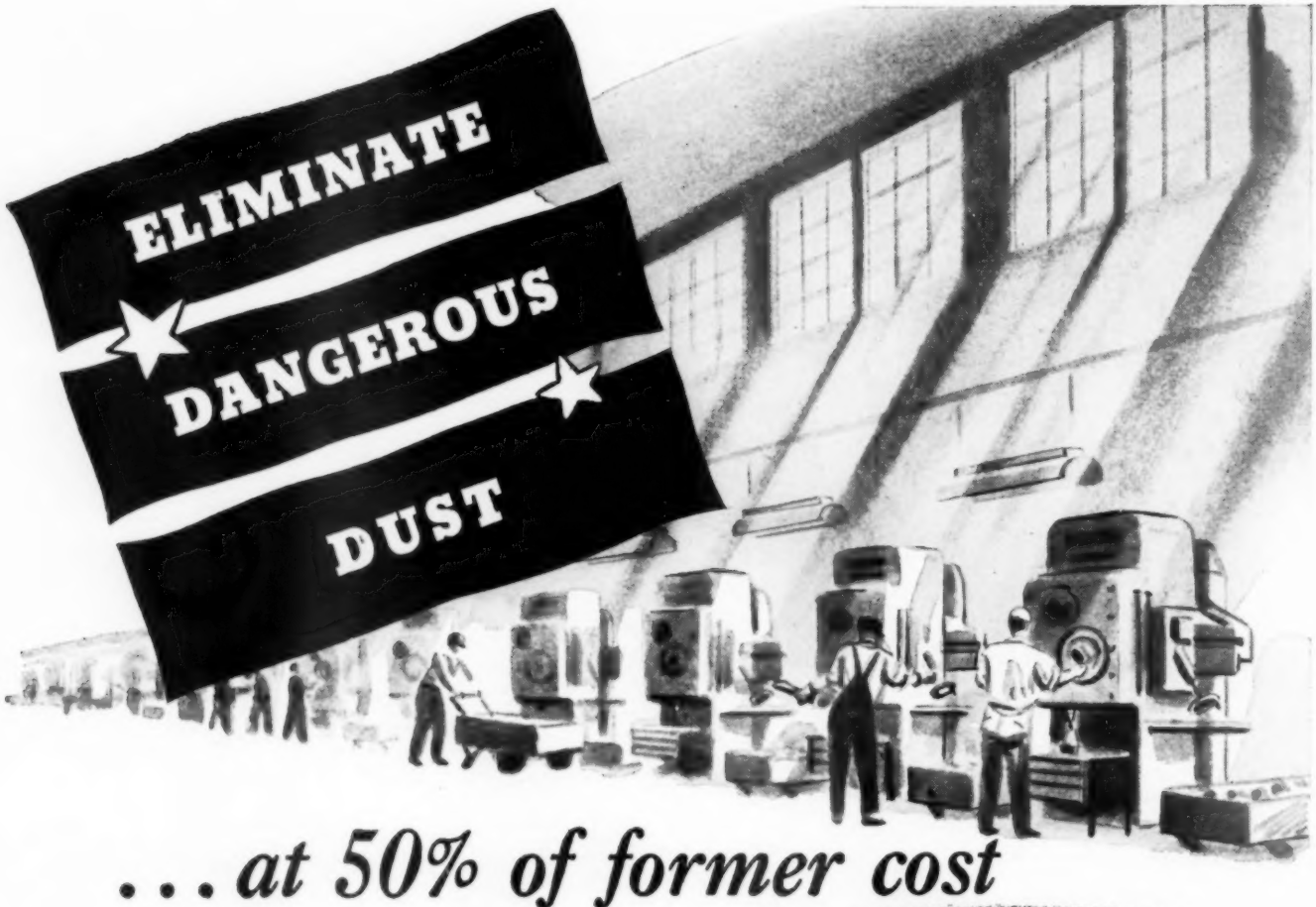
TRADE-MARK REG. U. S. PAT. OFF.



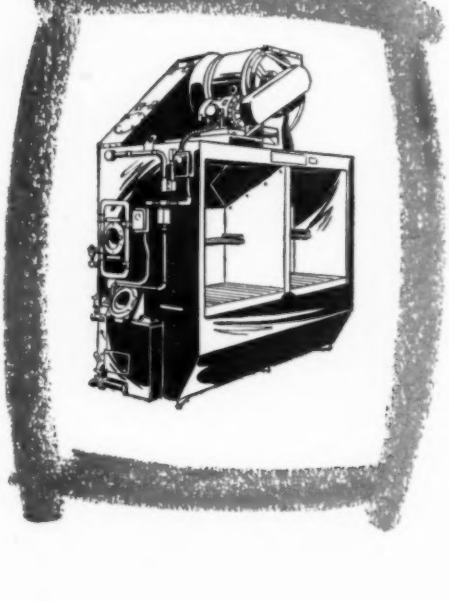


Means "Made By The Timken Roller Bearing Company." It identifies the source of Timken Tapered Roller Bearings, Timken Railroad Roller Bearings, Timken Alloy Steel, Timken Seamless Steel Tubing and Timken Rock Bits. This trade-mark is your assurance of getting genuine Timken products. Look for it when buying.

THE TIMKEN ROLLER BEARING COMPANY
CANTON 6, OHIO



. . . at 50% of former cost



Dust is dangerous, costly and downright annoying. Frequently explosive, always damaging to equipment and health, it is a major factor in high insurance rates and labor turnover. So why tolerate it when the best dust collection equipment made can be obtained from surplus at ½ price or less? Yes! Equipment suitable for every industry with a dust problem is now available from WAA. Some unused, some used, but all inexpensive and easy to get. Simply contact: Chief, Sales Section 67, in your nearest WAA Regional Office listed below. Do it while wide selections are still available.

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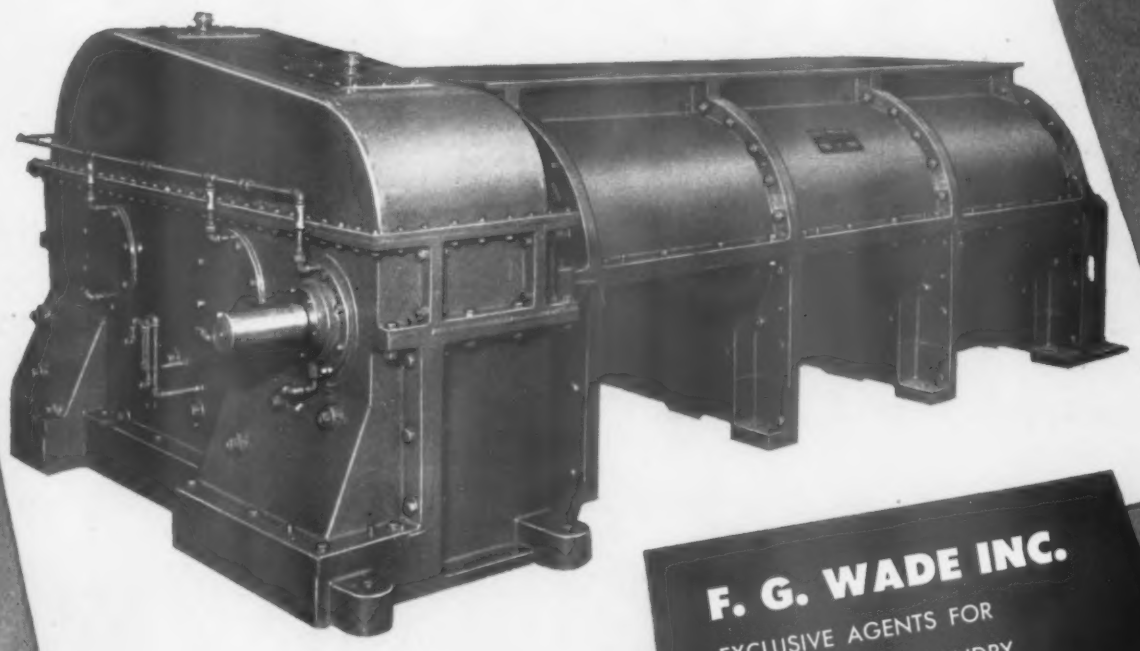
1051

INSTALL BAKER PERKINS CONTINUOUS SAND MULLERS AT 50% LOWER COST

Industry is looking to wide-open production in the near future . . . and to foundry operators that means a resumption of the thorough beating that foundry equipment took during the war years. Right now is the time to replace your inefficient and worn-out equipment, and you can't make a better beginning than to install B-P Continuous Sand Mullers. These fast, dependable machines often may be installed for 50% the cost of installing other types of mullers, and their operation is far and away superior in ease and efficiency. Sand mixed in a B-P Continuous Muller is thoroughly aerated as it is stirred in a figure-8 motion, and each grain is coated with the correct proportion of bond. That means your sand molds will turn out smoother, finer finished castings . . . with dependable regularity, too, because the B-P Continuous Muller mixes sand to perfect consistency and uniformity with no batch to batch variation. No expensive hydraulic or electrical controls required, no batch hoppers or large storage bins necessary. Below: A No. 5-A B-P Continuous Muller, capacity 100 to 120 tons of perfectly mulled sand per hour. BAKER PERKINS INC., FOUNDRY EQUIPMENT SALES, SAGINAW, MICHIGAN.

MEMBER

MANUFACTURERS' ASSOCIATION INC. FOUNDRY EQUIPMENT



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EXCLUSIVE AGENTS FOR
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DELTA FOUNDRY PRODUCTS

Every DELTA Foundry Product is backed by continuing and exhaustive laboratory research to safeguard quality and maintain absolute uniformity. From raw materials to the finished product manufacturing processes proceed under an automatic and persistent policy of laboratory control.

FOR FASTER PRODUCTION OF BETTER...CLEANER... LOWER COST CASTINGS...

CORE AND MOLD WASHES—

BASE MATERIAL
Mix with silica flour and water to produce finished base.

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FOR STEEL
STEELKOAT—Special Core & Mold Wash

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FOR ALUMINUM
GRAKOAT A-1

FOR GREY IRON AND MALLEABLE
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FOR ALL SAND CAST METALS
THERMOKOAT — It's Plasti-Lastic

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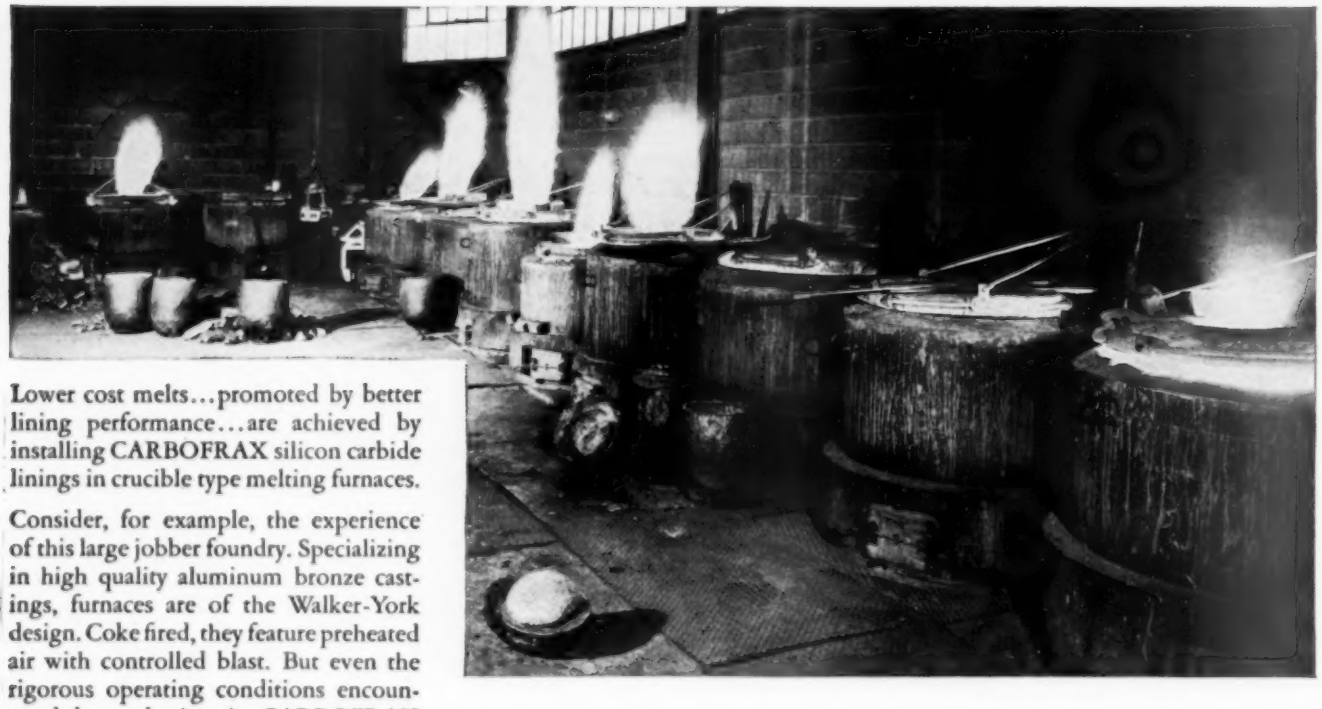
REDUCE MELTING COSTS

this Easy, Proven Way

HERE ARE RESULTS EXPERIENCED BY ONE LARGE JOBBING FOUNDRY

1. **LOWER LINING COST PER LB. OF METAL MELTED.** CARBOFRAX linings give longer life—require less frequent patching.
2. **STEADY, RELIABLE PRODUCTION.** As these linings do not deform under most severe operating conditions, both moderate and peak demands are fully satisfied.
3. **IMPROVED CRUCIBLE LIFE.** Retaining dimensions even after much service and with choking clinker formations eliminated, CARBOFRAX linings radiate heat uniformly to the crucible.
4. **REDUCED INSTALLATION COST.** Made accurately to size with rugged interlocking joints, CARBOFRAX blocks are quickly and easily installed.



Lower cost melts...promoted by better lining performance...are achieved by installing CARBOFRAX silicon carbide linings in crucible type melting furnaces.

Consider, for example, the experience of this large jobber foundry. Specializing in high quality aluminum bronze castings, furnaces are of the Walker-York design. Coke fired, they feature preheated air with controlled blast. But even the rigorous operating conditions encountered do not bother the CARBOFRAX linings. Their use makes possible the results tabulated—results that mean reduced costs per lb. of metal melted. Little wonder that all 14 furnaces are lined with CARBOFRAX blocks.

In hundreds of installations under a wide range of conditions, CARBOFRAX linings consistently provide these profit-yielding results. Ample assurance of their dependability is found in the high refractoriness, high hot strength and excellent resistance to spalling, cracking and flame erosion of CARBOFRAX blocks. Their unique characteristics make them equally valuable for use in oil or gas fired melting furnaces.

Therefore, if you are not already using CARBOFRAX linings, call in one of our engineers. He will be glad to supply complete data. Simply write Dept. L-57, The Carborundum Company, Refractories Division, Perth Amboy, N. J.

SUPER REFRACTORIES

BY CARBORUNDUM

TRADE MARK

"Carborundum" and "Carbofrax" are registered trademarks which indicate manufacture by The Carborundum Company

Pangborn
PIONEERS AGAIN!

NEW wet blast development cleans castings and knocks out cores at same time...rapidly...economically!

Now — core removal and sand blasting of large, medium and small castings can be accomplished in one economical operation — in a single flood-lighted enclosure!

Pangborn's new HYDRO-SAND BLAST AND CORE KNOCKOUT — shown above in successful operation at a Cincinnati foundry — uses a combination of sand and water to remove cores and clean castings, inside and out.

A turret gun — operated *from outside* the heavy steel plate room — directs a sharp stream of sand and water, at 1200–1600 psi upon the casting mounted on a rotating table. (75 gallons of water per minute with entrained sand).

Sand is re-usable. After tramp material has been screened out, the sand is returned to the sand blast tank.

Core-Knockout Features

Proven features of the HYDRO CORE-KNOCK-OUT BLAST ROOM have been retained —

- Quick cleaning of fillet and pockets
- Core rods removed without sledges
- No bending or distortion of core rods
- Roll-back roof for crane-loading of large pieces
- Two water-cleaned glass windows
- Free-turning table can be stopped in any position

For further information on HYDRO-SAND BLAST AND CORE KNOCKOUT, write to Pangborn, *world's largest manufacturer of blast cleaning and dust control equipment.* Pangborn Corporation, 1300 Pangborn Boulevard, Hagerstown, Md.

Pangborn BLAST CLEANS CHEAPER

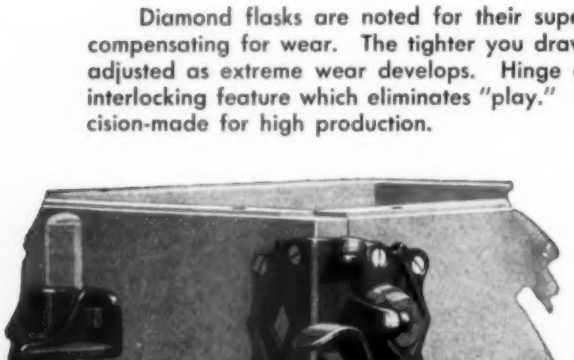
PANGBORN CORPORATION HAGERSTOWN, MARYLAND

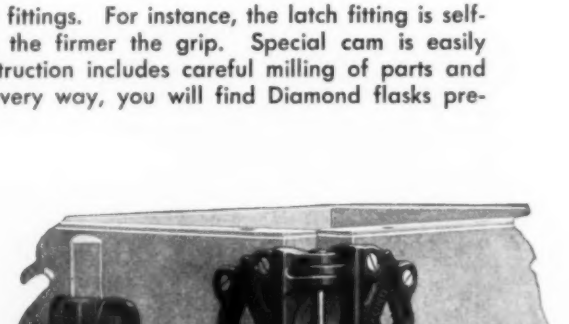
with the right equipment for every job

ALL OUT FOR DIAMOND FLASKS

Another foundry modernizes to speed production and reduce costs with Diamond Flask Molding Equipment.

Diamond flasks are noted for their superior fittings. For instance, the latch fitting is self-compensating for wear. The tighter you draw it, the firmer the grip. Special cam is easily adjusted as extreme wear develops. Hinge construction includes careful milling of parts and interlocking feature which eliminates "play." In every way, you will find Diamond flasks precision-made for high production.





Our Flask Line is complete, of course, including all *special shapes* and a related line of *steel jackets.*

Originators of SNAP FLASKS

DIAMOND

Telephone 2553 **CLAMP AND FLASK COMPANY** Richmond, Indiana

Designers of* CORE PLATES, JACKETS, BANDS, FLASKS *since 1889

9 pounds of Ni-Rod saved this $150 iron casting

After this iron pipe guide barrel had been cast, the foundry discovered that the pattern had been made too small on four projections.

The damage was done... *but not permanently*. For the foundry was able to do a perfect build-up job with Ni-Rod.*

Each of the 4 areas shown in the accompanying sketch were ground down in preparation for the welding. Then, using 5/32" electrodes, Ni-Rod was deposited at 130 amps, d.c., reversed polarity. Seven passes were made to build up 3 layers. After welding, the deposits were peened and machined to the correct over-all dimension of $22'' + 0.000'' - 0.032''$.

No preheat was necessary.

Said the welder, *"Ni-Rod is the best rod I ever used on cast iron."*

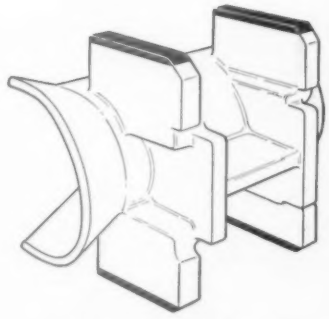
* * * * *

Money-saving repairs and enthusiastic comments like this are typical of Ni-Rod.

Why?

Because smooth-handling Ni-Rod gives you *strong* welds... *sound* welds... *machinable* welds... and usually *without* pre-heating.

If you haven't tried Ni-Rod, order a package today. Rods come in 3/32", 1/8", 5/32" and 3/16" diameters. There'll be plenty of times when you can use Ni-Rod for quick, easy and money-saving repairs on defective castings. *Reg. U. S. Pat. Off.



WHERE THEY BUILT UP THE CASTING WITH NI-ROD

Each of the 4 darkened projections was ¼" too short. By building up the undersize areas with only 9 pounds of Ni-Rod, an otherwise perfect casting (worth $150) was saved. Over-all length and height: 28" x 22". Weight: 300 lbs. Area of repair: 2" x 10".

SEND FOR INSTRUCTION BOOKLET

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

INCO NI-ROD TRADE MARK

NI-ROD IS DISTRIBUTED BY:

WHITEHEAD METAL PRODUCTS COMPANY, INC.
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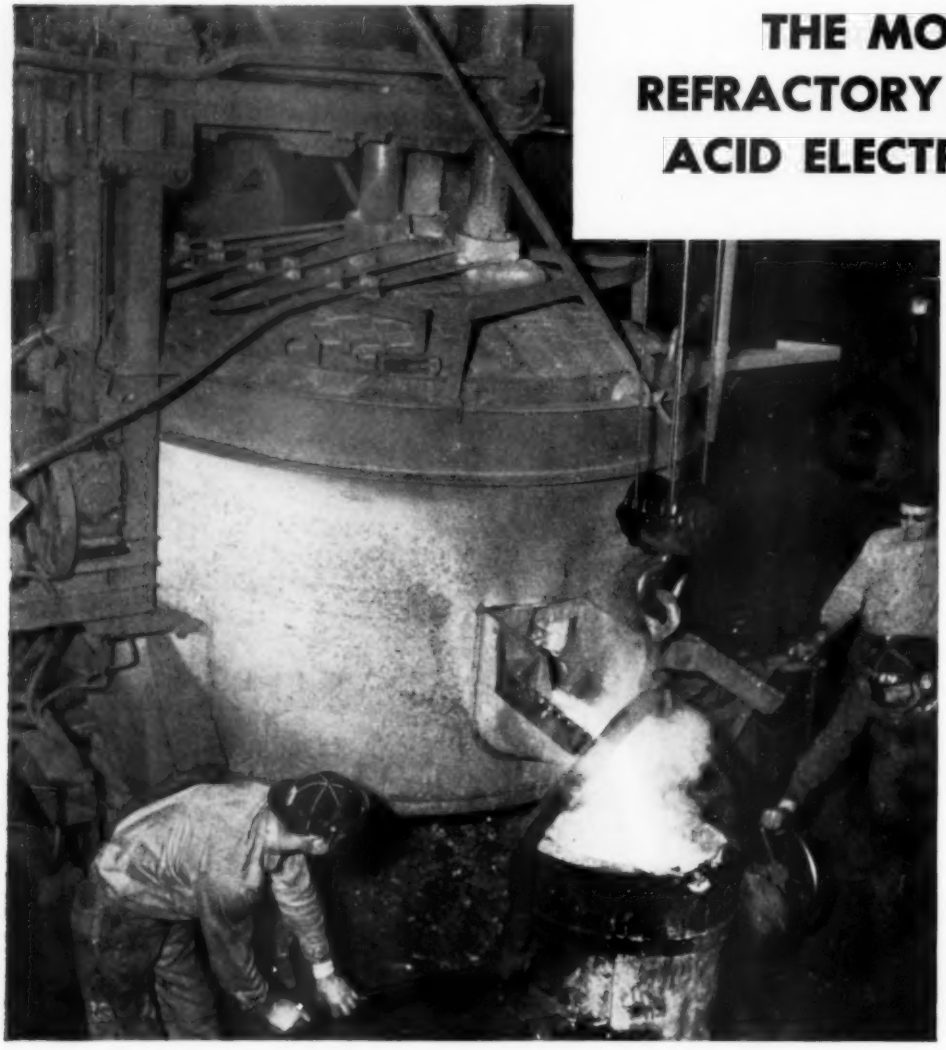
IRONTON CARO-LINE

THE MONOLITHIC REFRACTORY MATERIAL FOR ACID ELECTRIC FURNACES



"Ironton Caro-Line" is used in electric steel foundries all over the United States and is also being used in Canada, Mexico and Chile.

"Ironton Caro-Line" siliceous ramming refractory is being used by Skagit Steel and Iron Works at Sedro-Woolley, Washington, where this Greene electric furnace is in operation. Mr. Jack Hebert, the Foundry Superintendent uses it in the furnace bottom and for lining his ladles. He says, "We are very much pleased with our results from Ironton Caro-Line".

Ask us for data on this unusual refractory material.

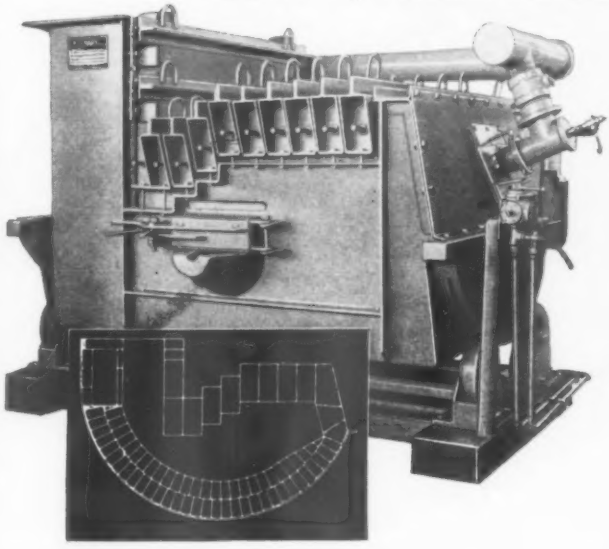
THE IRONTON FIRE BRICK COMPANY

RELIABLE REFRACTORIES

IRONTON OHIO

STROMAN FURNACES are Engineered for Perfection!

When you install a Stroman Furnace in your foundry, die casting or permanent mold plant you will be astounded at its extremely efficient operation . . . great economy in fuel consumption...speed of melting time and ease of handling. Stroman Furnaces have proved themselves to be the best available for any non-ferrous melting job. Write today for complete information



SKLENAR FURNACES

For melting Brass, Bronze or Aluminum, Sklenar Non-Crucible, Direct Fired, Reverberatory Melting Furnaces, are the fastest ever built. Their Design is unique. Metal is charged into a hopper which is also an exhaust from the combustion chamber. Here metal is preheated and melted at the throat of the hopper. Cold metal does not reach the molten bath. Charging is continuous. These furnaces will show fuel savings up to 40%; as the combustion chamber is heated by the same fuel that is used to melt the metal at the throat of the hopper. They are also very successful in the making of Grey Iron Castings. The furnace illustrated is the 1200 lb. (brass capacity) size, and is oil fired. Gas fire is also available. Full information upon request.

STROMAN MECHANICAL OR HYDRAULIC TILT CRUCIBLE MELTING FURNACES

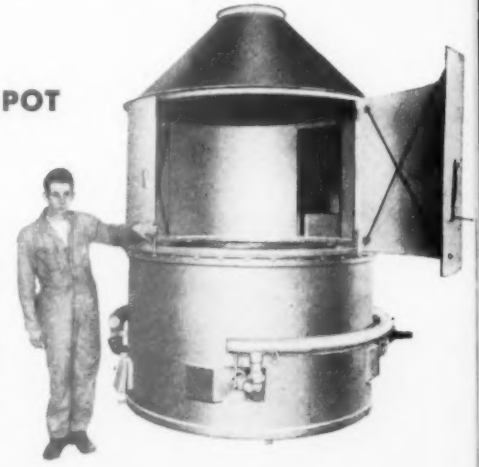
For Brass, Bronze, Aluminum and other non-ferrous metals. These Stroman Furnaces embody the famous Stationary Lip Pour Feature which assures a constant pouring arc, eliminating the necessity of moving the ladle at any time during a pour. They are excellent for use in permanent mold and die casting plants as well as any foundry. Their sturdy construction assures longest life, and their economical operation results in lowest production costs. Choice of oil or gas fire. Built in sizes to handle capacities from No. 125 to No. 400 crucible.

STROMAN CRUCIBLE STATIONARY MELTING FURNACES

For Brass, Bronze, Aluminum and other non-ferrous metals. Sturdy, efficient and featuring the Stroman Push-Back Cover these stationary furnaces are designed for peak production and greatest fuel economy. Oil or Gas Fire. Capacities from No. 20 to No. 400 crucible.

STROMAN IRON POT STATIONARY MELTING FURNACES

These furnaces are highly recommended as break down furnaces for zinc die casting plants. They also excel as aluminum holding furnaces. They can be supplied with or without hoods to exhaust fumes and heat. Their construction assures longest pot life and lowest fuel costs. Choice of manual or automatic controls and gas or oil fire. Capacities from 212 to 14,000 lbs. of zinc. Other metals in proportion.



Write for Complete Information at Once

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

Cast Iron

JACKETS

Are Best by Test

FREMONT MAGNESIUM FLASKS

ACCURATE.

STURDY...

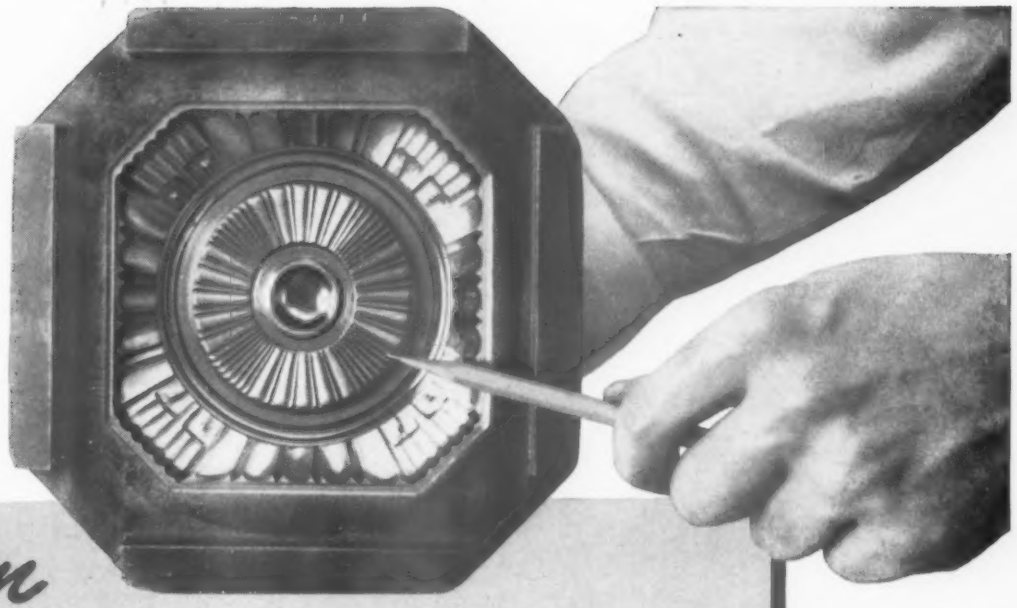
LIGHT.....

BUILT FOR LONG SERVICE AND FAST PRODUCTION

GROOVLOCK

THE FOOL-PROOF PIN

THE FREMONT FLASK CO.
Fremont, Ohio



When MACHINABILITY Comes First...

IT PAYS TO USE Chateaugay PIG IRON

Take this intricately machined lamp base mold, for example. It's made of Republic CHATEAUGAY Pig Iron. The reason is that still another foundry has learned from actual experience that there's no better or more economical means for insuring flaw-free, easy-to-machine casting surfaces.

When made with CHATEAUGAY Pig Iron, it makes no difference how large or how small the casting. It can be milled, drilled, turned or otherwise machined quickly, easily and economically.

Actually, CHATEAUGAY is a low-phosphorous, copper-free pig iron which consistently out-performs other pig irons. It flows smoothly, sets rapidly and cools evenly, and its highly uniform distribution of chemical elements means a dense, fine grain structure in *all* castings, regardless of size or shape.

Why not let a Republic Pig Iron Metallurgist give you the complete story about CHATEAUGAY at your convenience? Just let us know when you would like him to call.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES: CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

MID AMERICA EXPOSITION CLEVELAND

Republic PIG IRON

"CHATEAUGAY"	"REPUBLIC"	"PIONEER"
Low-Phosphorus, Copper-Free	(Northern) Foundry, Basic and Malleable	(Southern) Foundry and Basic

REPUBLIC STEEL

ALSO TRUSCON FOUNDRY FLASKS • REPUBLIC CORE WIRE • FOUNDRY NAILS

"Mulling the sand every time it is used has greatly improved the quality of our castings and reduced our scrap loss"

Our New Name is
RELIABLE CASTINGS CORPORATION

The RELIABLE PATTERN & CASTINGS CO.

3530 SPRING GROVE AVENUE CINCINNATI 23, OHIO

March 14th
1947

National Engineering Co.,
549 W. WashingtonBlvd.,
Chicago 6, Illinois.

Attention of Mr. Bruce L. Simpson
President

Gentlemen:-

It was indeed a pleasure to have your Mr. Fuller call on us last week, not to sell us something, but merely to check on the molding system you installed for us some two years ago. Such personal interest is one of the reasons we have found our National installation so satisfactory; you did not forget us once the equipment was installed and paid for.

The installation of this sand handling equipment has given us advantages in labor saving, but most important to us has been the improvement in the conditioning of our molding sand. Mulling the sand every time it is used has greatly improved the quality of our castings and reduced our scrap loss.

We have had very little maintenance on this system and are very much pleased with the installation and we thought you would like to have this tangible expression of our satisfaction.

Yours very truly,

RELIABLE CASTINGS CORPORATION

Arthur Kuhn

Arthur Kuhn, Secy. Treas.

AK:LSB

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Right: Molding sand preparation plant at the Reliable foundry, showing storage bin, automatic discharge gate and skip hoist which carries sand to the Simpson Mixer on the platform. *Below:* Closeup view of the mixer, with sand delivery buggy below aerator.

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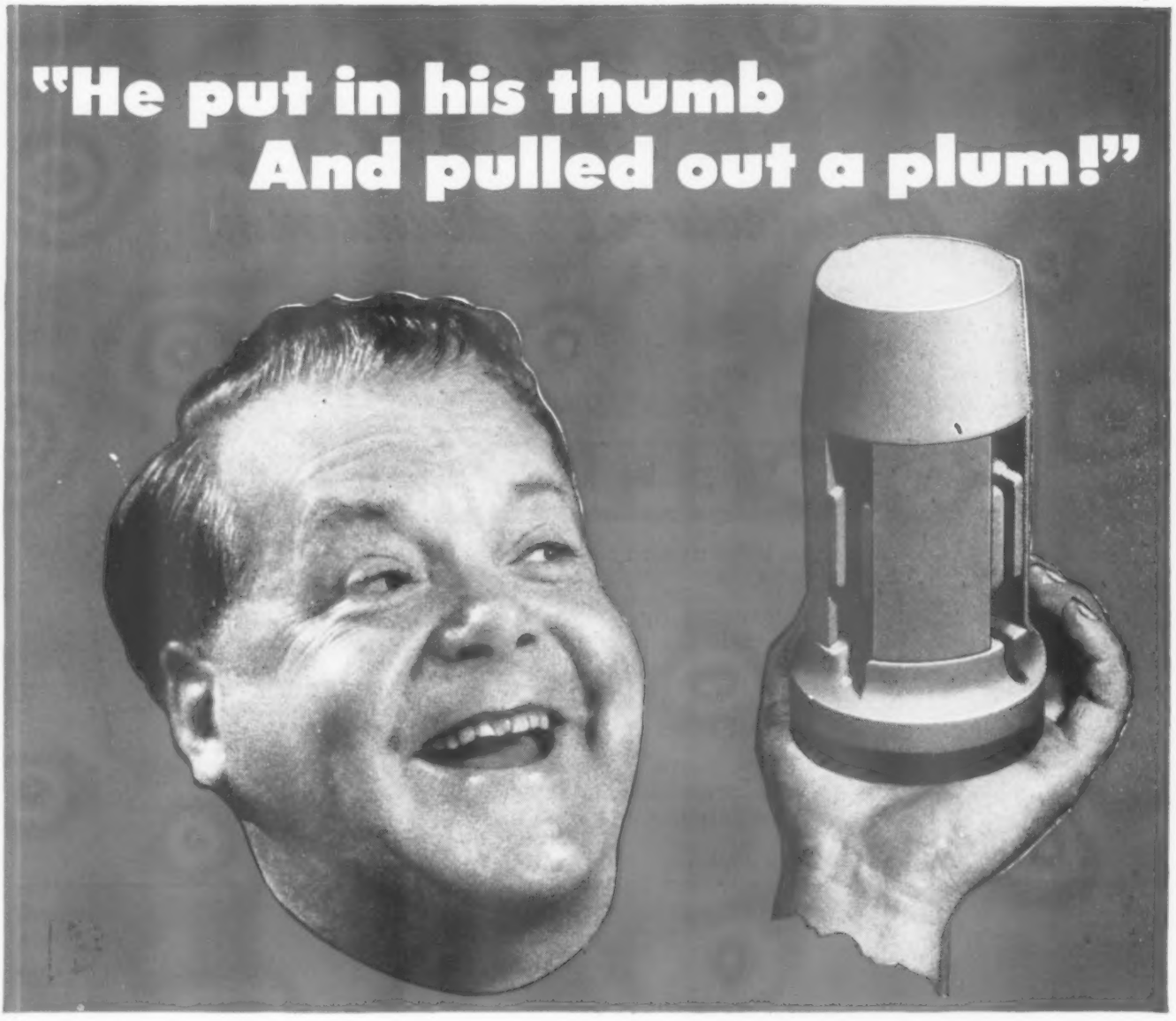

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Educational Foundation Should Be Supported

BACK in the Gay Nineties and early in this century, when the first simple machines began to replace certain manual jobs in foundries, an entirely new trend in production methods got under way. In the period since, and especially during the past decade, this trend toward mechanization has been accelerated greatly. While the possibilities for further progress in this direction remain great, the fact remains that the application of machinery, coupled with far greater knowledge of the variables of foundry practice and the metallurgy of metals, have changed the production of castings from an art into a science. Technical developments in the production of castings have made it imperative that engineers be available to carry on successfully the complex operations of the modern foundry.

Many foundrymen have recognized the necessity for more technically trained men in the industry. For example, the manager of a large captive foundry recently pointed out that "the introduction of mechanized processes into the operation of a foundry requires that old-time foundrymen, steeped in the secrets of their art, be supplanted by technically trained personnel for maintenance of equipment, quality and process control, and supervisory positions."

Over a period of years, committees of both trade and technical associations, as well as individual companies, have tried to interest more engineering students in the foundry industry as a career, and to get more foundrymen conscious of the growing need for technical men. Much progress has been made but the efforts lacked sufficient co-ordination to provide maximum success. All of this is being changed, for now the foundry industry has the opportunity of really going to town in the training of foundry engineers.

As was announced in the April issue of THE FOUNDRY, representatives of the Gray Iron Founders' Society, the Malleable Founders' Society, and the American Foundrymen's Association have studied the problem thoroughly and, as a result of these investigations, recently have incorporated the Foundry Educational Foundation, with the following trustees: Ben D. Claffey, Richard W. Crannell, Anthony Haswell, John M. Price, Peter E. Rentschler, Fred G. Sefing, James H. Smith and Stowell C. Wasson. The Foundation now has a campaign under way to raise a fund of $280,000, which will be used in a three-year program to establish new foundry engineering courses at Case, Cincinnati, Cornell, M.I.T. and Wisconsin; to assist these institutions in procuring necessary equipment for the proper handling of these courses; to establish scholarships at these colleges, and to encourage prominent young men to enroll in these courses.

Every foundry in the United States will be given an opportunity to participate in this program. The fund raising committee, under the chairmanship of Mr. Price, is suggesting contributions on the basis of $1 per employee per year for three years.

If producers of castings are to be assured of an adequate supply of men trained for technical and executive positions in the years immediately ahead there should be no hesitancy in providing the funds needed by the Foundry Educational Foundation. Every company should contribute generously to this much needed co-operative enterprise.

Frank G. Steinebach
Editor

Adopts *Chemically Coated*

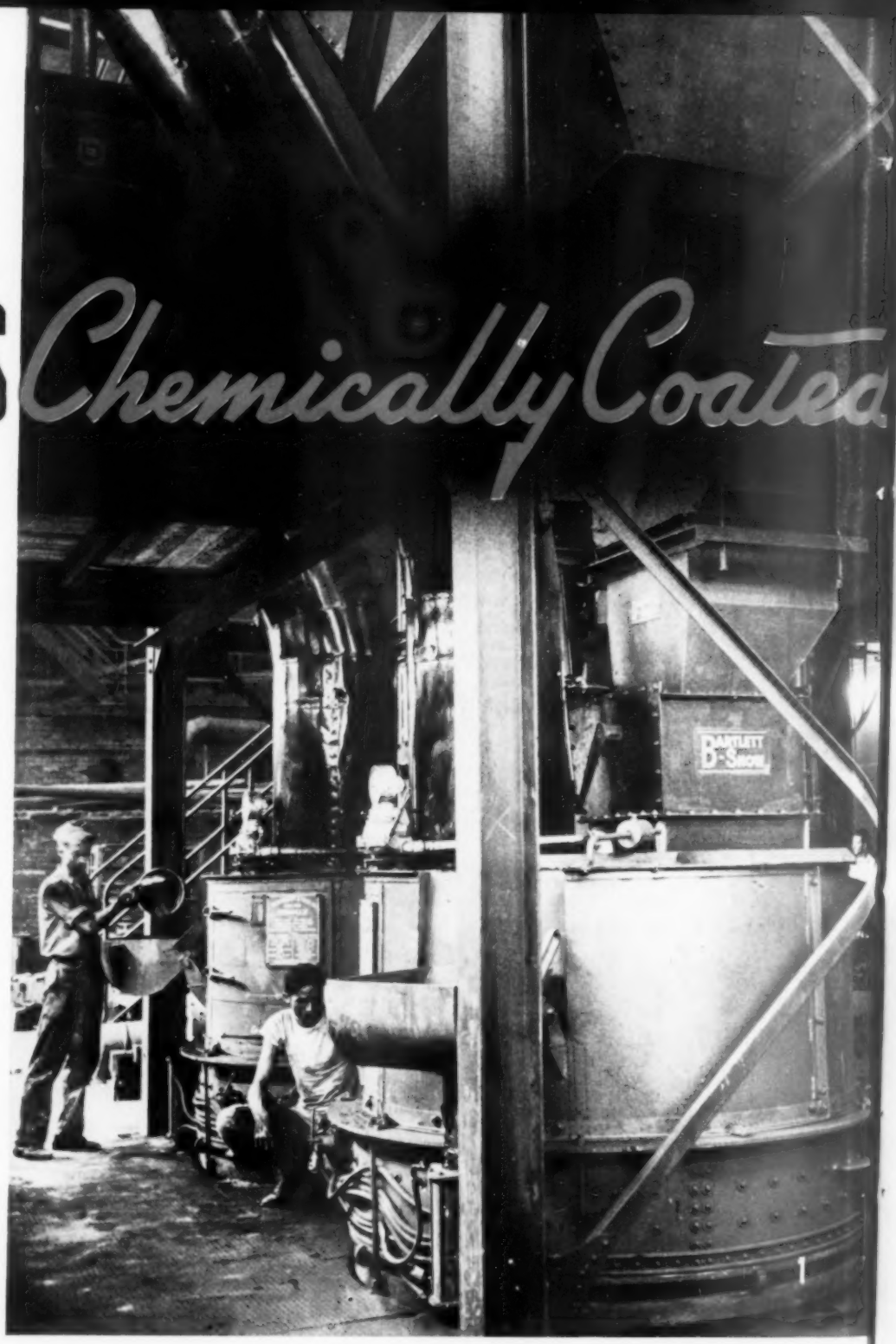


Fig. 1 — Two mullers which supply mixed sand to the company's mechanized foundry units

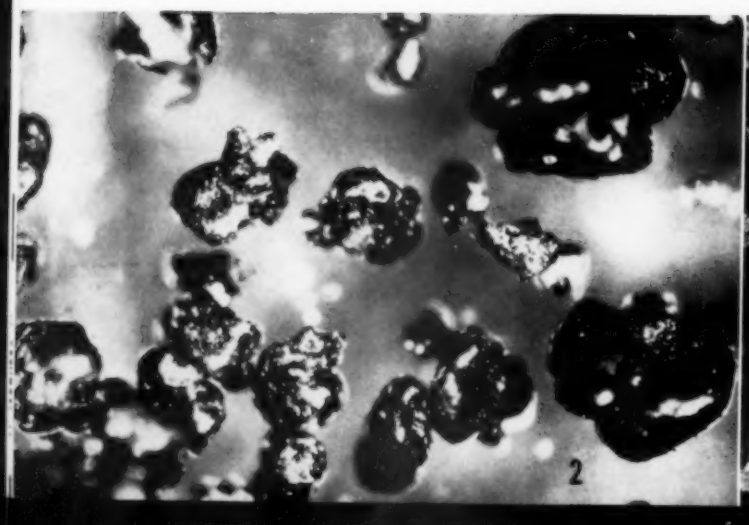
Fig. 2 — Chemically coated sand. Grains actually are jet black; the white high lights were caused by light reflection

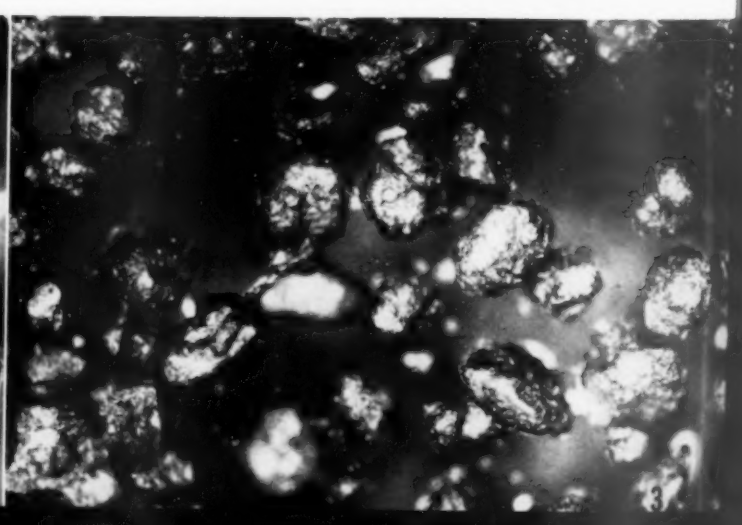
Fig. 3 — Chemically coated sand after being reused ten times

Fig. 4—Typical sea-coal and bentonite sand mixture

Fig. 5 — Same as in Fig. 4 after being reused ten times

(Sand photos, at 50 magnifications, by courtesy of Battelle Memorial Institute, Columbus, O.)





The first foundry to make commercial use of chemically coated molding sand, Lynchburg Foundry Co. reports important benefits in operating practice and lower costs resulting from this new and widely discussed process

By WILLIAM G. GUDE
Managing Editor
THE FOUNDRY

Molding Sand

EARLY this year the Lynchburg Foundry Co. changed over its sand system to the use of chemically coated molding sand in the mechanized section of its gray iron foundry at Lynchburg, Va. The move was significant in that it marked the first commercial adoption of a practice which is a radical departure from generally accepted materials and methods for molding sand preparation.

The operation involved in providing this new type of sand treatment is relatively simple, requiring no complicated equipment. However, the present status of the process represents the culmination of an extended period of development work in adapting the chemical to give the desired sand properties in large-scale use. The company spent about a year in this experimental phase before it was satisfied with the merits of chemically coated sand.

Considerable research work also had preceded the initial investigations by Lynchburg Foundry Co. Approximately a year and a half ago, Arthur H. Allen, Detroit editor of THE FOUNDRY, reported in this publication that a Detroit chemist and engineer was studying the chemical treatment of sand to produce a uniform coating of carbon on each grain and that preliminary tests had shown considerable promise in the way of reducing molding costs and improving casting finish. The Detroit chemist referred to was B. M. Weston of Foundry Development Engineers Inc., United Artists Building, Detroit, and the product he has been instrumental in developing for treatment of molding sand is known as Westonite.

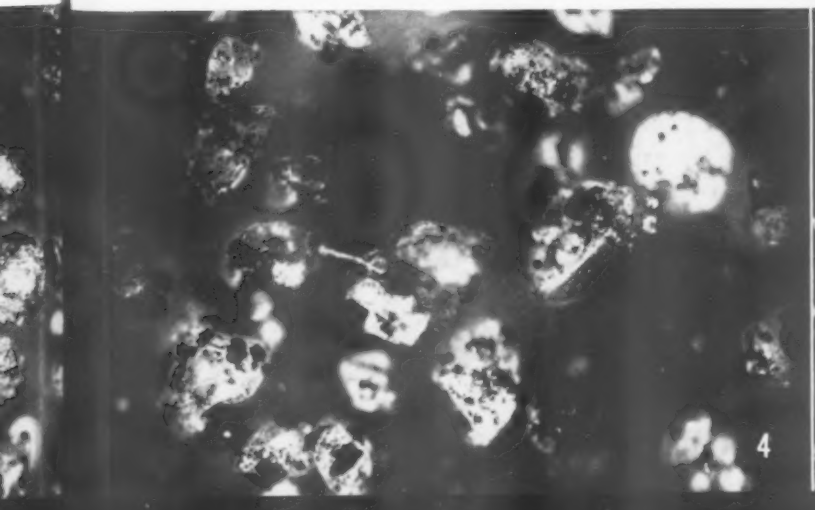
A liquid plastic of rather low viscosity, this new material essentially is a resin dissolved in a solvent the whole of which is water soluble. Sand first is coated by mixing it with Westonite in an ordinary foundry mixer and then passing it through a rotary drier at 350 F. The resulting coating is non-thermo setting and extremely refractory; it will not fuse but it will burn completely without an ash residue. Start of combustion and the completeness of combustion are regulated by a catalyst in the coating.

After each use of the sand further small additions of Westonite are made to plasticize the resin coating and recoat the grains which have had the resin burned off during pouring; also to coat the core sand which has fallen into the system at the shakeout, and to activate the bond additions. This added plastic is fixed to the grains by the heat of pouring. Because the sand is completely coated the usual fluxing action at the mold face on pouring is eliminated.

Fig. 2 shows a chemically coated sand photographed at 50 magnifications with use of polarized light. Although each grain actually is jet black, the coating is so dense it acts as a mirror and the resulting light reflection caused the white high lights that appear in the illustration. In Fig. 3, showing the same sand after being reused ten times, the coating is still black, but since it is rougher the light reflections are less pronounced. It will be noted that the coating still completely encompasses each grain.

By way of comparison, Fig. 4 is a typical seacoal and bentonite sand mixture at 50 magnifications using the same lighting system. It shows the clear translucent or transparent grains with numerous particles of seacoal. Fig. 5 shows this latter sand after being reused ten times and also discloses loose particles of seacoal, although many of the grains are partially coated with seacoal and bentonite.

Various factors interested the Lynchburgh Foundry Co. in use of this chemically coated sand. An important one was its need for improved flowability of sand, particularly in molding certain types of castings which involve deep pattern recesses, and at the same time maintain good surface finish. Another factor was the desire to speed up the sand mixing cycle in order to reduce down time occasioned by the molding department's waiting for sand.



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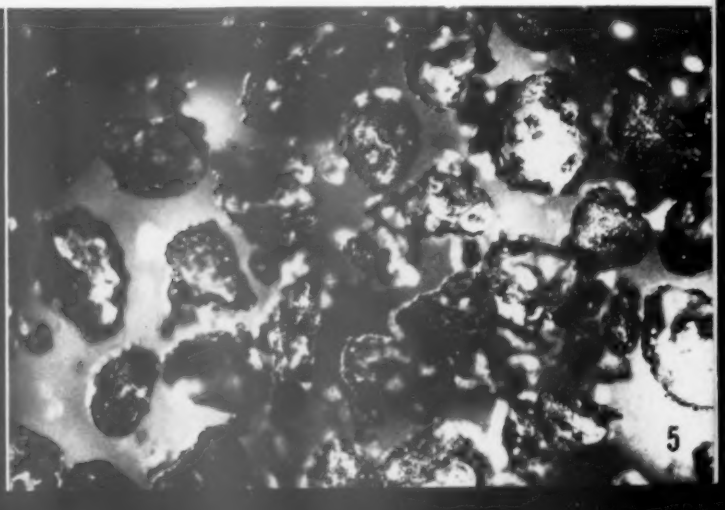

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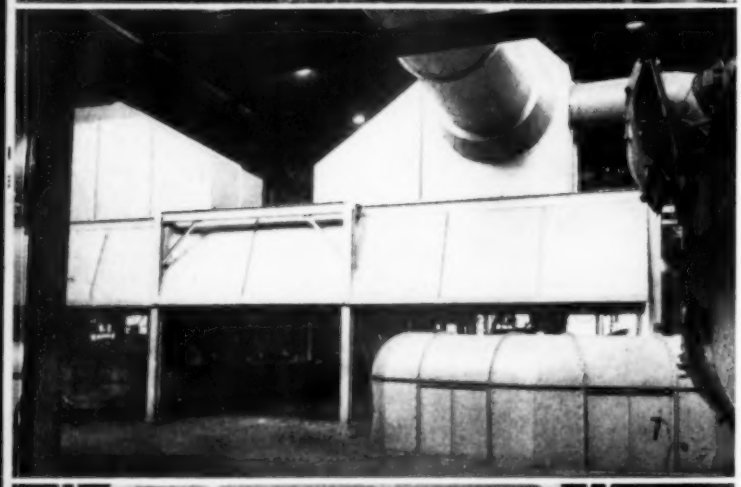


Chemically Coated Molding Sand

The company's mechanized foundry unit consists of three molding and pouring loops served by continuous power mold conveyors. The two jolt-squeeze-strip cope and drag molding machines for each loop receive their sand overhead from a central sand distribution system containing about 150 tons. Of this total between 75 and 100 tons represents sand actively in use at one time. Operations are conducted on a 24-hour-daily basis six days a week which provides 22½ hours of actual molding time per day.

Castings produced on these three lines cover a wide range in size and type, the smallest weighing about 3½ lb with a metal section of 5/16-in., and the largest 350 lb with a 5-in. metal section. Usually a total of between 10 and 15 pattern changes are involved each week on the three loops and the work is apportioned among the loops according to size of the castings. No. 3 loop handles the larger and usually the heaviest jobs, and these generally are of the type having deep recesses which require a sand of good flowability for satisfactory molding. Furthermore, the size of certain castings being made necessitates use of somewhat larger flasks than would ordinarily be employed with the molding machines available. The largest flasks used on No. 3 loop are 30 x 42 x 14 in.; on No. 2 loop they are 30 x 36 x 14 in. and on No. 1 loop are 24 in. square. These three loops handle a daily average pour of 125 to 150 tons of castings.

Sand Mix Is Adapted To All Size Castings

Composition of the system sand mixture is dominated by the requirements of No. 3 loop, since shakeout sand from all three loops is returned to a common storage bin prior to preparation and reuse. While the properties of one sand mixture might be satisfactory for the smallest and medium size castings, unless they were equally well adapted to production of the largest castings the mixture would not be acceptable. This difficulty is said to be overcome with use of the chemically coated sand.

When the company's sand system was changed over to the new process, all of the old sand was removed and replaced by a No. 60 New Jersey silica sand already coated with Westonite. The relatively small additions of the chemical that are required as the sand is reused are made as simply as would be the introduction of water alone.

Mixing is done in one of two mullers, with the following additions to each 1100 lb of sand: 1 qt cereal, ½-qt western bentonite, and 1½ to 2 qt Westonite mixed with an equal part of water. The company's practice is to add the chemical to the water in a large container and draw it off as required. This mixture is kept in constant agitation by air introduced through a pipe in the container. Prior to adoption of the chemically coated sand the company employed a synthetic molding sand mixture which included the following average additions to each 1100 lb of sand: 2.3 qt cereal, 2 qt bentonite, 5 qt sea-

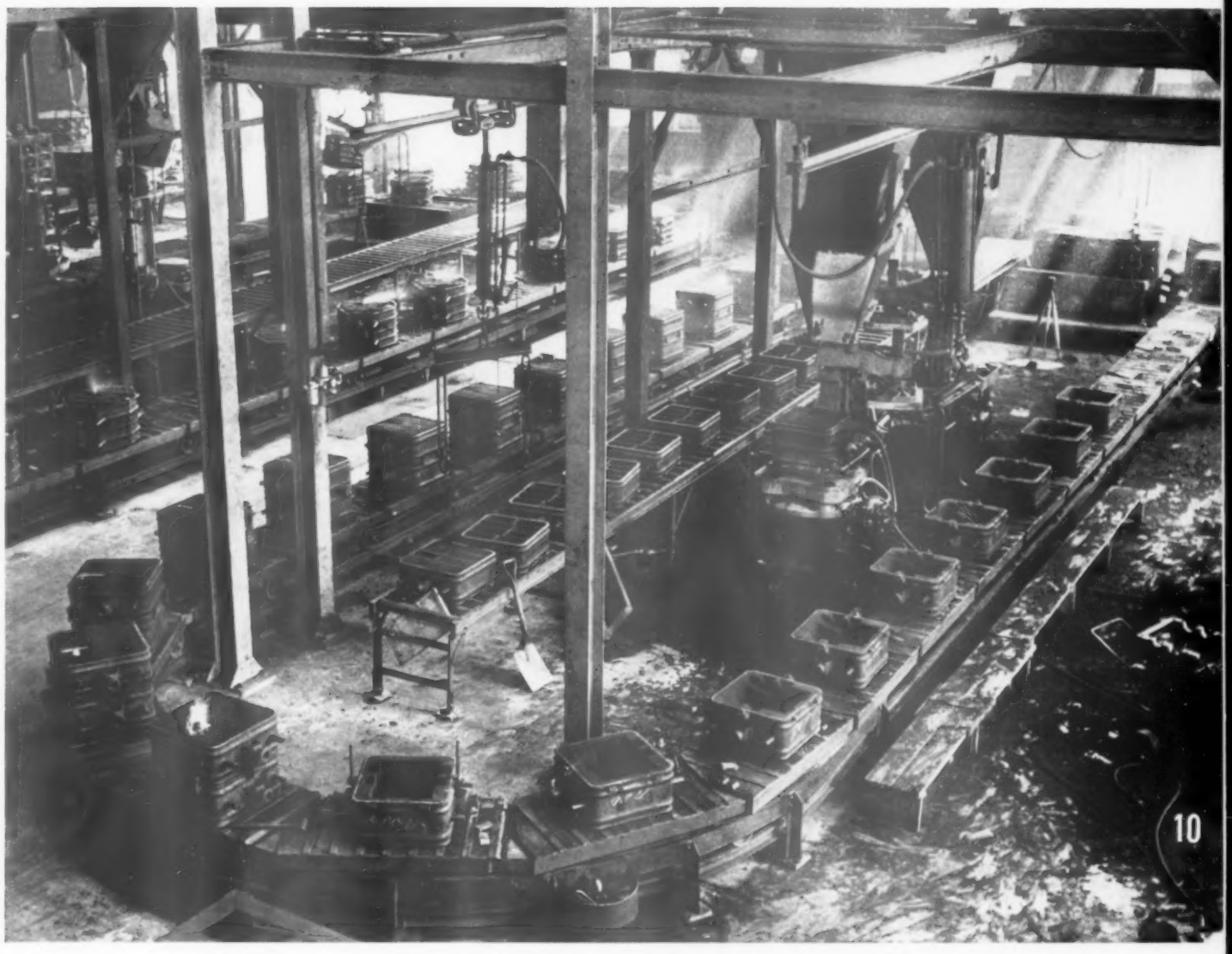


Fig. 6—Power conveyor carries molds through fume tunnel after pouring. White material on top of molds is silica sand. New sand is added to the system in regular and uniform amount in this manner

Fig. 7—Shakeout end of two of the three conveyor loops. Smoke generated at shakeout by the new sand mixture is quickly withdrawn by the overhead exhaust system

Fig. 8—Closing a mold. This mold is for an automotive timing gear housing

Fig. 9—Drag of mold for one of the larger castings regularly produced by the company. The complete mold is shown in Fig. 12, the finished casting in Fig. 14

Fig. 10—View before installation of fume tunnel and shakeout exhaust to show arrangement of conveyor and molding equipment of one of the loops

coal and ½-qt pitch.

Action of the chemical in completely plasticizing the coating on the sand grains during mulling is rapid. The present mulling cycle requires 1.4 minutes, 50 seconds of which represent the time the sand actually is being mulled and the remainder the time required for loading, making additions and unloading. This is a reduction of nearly 40 per cent compared with the former mulling cycle of 2.3 minutes. Increased speed of mixing is partly due to the fact that the plastic activates and has a wetting action on the clay present. The sand mixture has a green compressive strength of 8 to 8½ psi, deformation of 0.020 to 0.023 in. per in., permeability of 65 to 75, and moisture content of 2.5 to 2.8 per cent. A noticeable characteristic of the mixed sand is its soft texture and freedom from clay lumps.

Flowability property inherent in the sand is reflected in a higher rate of mold production compared with previous practice, the company reporting an average reduction of approximately 50 per cent in the number of jolts required by its machines to attain desired mold hardness. At the shakeout no appreciable benefit from use of chemically coated sand is apparent in time involved in the operation, but the removed sand is cleaner than usual in that there is

Chemically Coated Molding Sand

a decided absence of lumps, and the castings have comparatively little sand adhering to the surface and in recesses. Sand that is removed by the system screen consists largely of core butts.

Despite the high flowability of the sand, it does not have the brittleness which commonly accompanies this property. Reason for this is that the plasticizing chemical in Westonite makes the surface of the coating slightly tacky. The sand will flow freely under no pressure but the grains cohere under pressure.

The chemical binder itself is nontoxic, and the fumes released at the shakeout, while slightly greater than under former practice, are not objectionable. In fact, Lynchburgh workers have commented favorably on this aspect of the new process and on the absence of seacoal and pitch. Castings are shaken out while red hot—which naturally tends to increase the amount of smoke and dust released—but the shakeout stations are equipped with a highly efficient exhaust system, and its operation is aided by the fact the fumes that are generated are relatively light and rise rapidly to the exhaust duct. The chemical is nonflammable when combined with water vapor.

One of the more important beneficial results the company has derived from use of the new sand mixture is the effect on casting finish. Improved flowability affects this more than any other property. The sand resists the tendency of the metal to burn in; also it is not inclined to adhere strongly to the hot casting. Both factors contribute to a comparatively smooth surface on the casting as it is broken out of the mold, and while this does not eliminate

Fig. 11 — A 186-lb casting for a rotary compressor. Metal section at head end is 3½ in. All of the castings pictured here were made using chemically coated sand

Fig. 12 — This loop handles the larger and usually the heaviest castings. The view is before tunnel and shakeout exhaust were installed

Fig. 13 — Refrigeration compressor casting, weight 86 lb

Fig. 14 — Cope view of casting made in molds shown in Fig. 12. Weight 254 lb

Fig. 15 — Cope view of two 100-lb tractor drums

the need for subsequent blast cleaning, it has permitted the latter operation to be performed more quickly.

The castings shown in Figs. 11, 13, 14 and 15 were made in molds of chemically coated sand.

Most castings are cleaned in airless blast barrels, with the largest castings handled in an air blast room. The blasting cycle on the barrels formerly was 17 minutes, 10 minutes of which was the actual blasting time. With use of the new sand this latter figure has been cut to 6 minutes, representing a reduction of 23.5 per cent in time required for the complete cycle. The company sees possibilities of bettering this time even further in the near future.

Relatively few castings produced by Lynchburg Foundry Co. require surface grinding, consequently savings in this operation through improved surface finish are correspondingly small in total. On individual items, however, worthwhile economies are reported; for instance, grinding time on a 100-lb drum is said to have been reduced 35 per cent, and on a 52-lb gear housing the reduction is indicated as 15 per cent.

Shows Reduction In Cost

All of the savings listed so far in the various operations add up to an impressive total. This is not a net saving, however, because from it must be deducted the increased cost of materials incident to use of chemically coated sand. Although smaller quantities of cereal and clay binder are used than formerly, cost of these materials and the Westonite added to each muller load of 1100 pounds of sand is approximately 25 to 33 cents, compared with slightly under 20 cents for the cost of the additions used in the old sand mixture.

At the end of the first month's operation with chemically coated sand the company made a detailed study to determine the influence on production and costs. It was found that the shortened mulling cycle had speeded sand delivery sufficiently so that the molding department was down while waiting for sand only 18.5 per cent of the time. Previously this figure was 26 per cent, and the reduction made available for productive labor about 60 man-hours daily which is given a direct and indirect labor valuation of $185.

Increased production of molds traceable to the improved flowability of the sand is placed at an average of 10 per cent. This increase, varying somewhat with different castings, was realized with no change in molding cost and is evaluated in terms of direct and indirect labor at $192.

Savings in cleaning costs are placed at about $105 daily for blast cleaning alone, with additional economies not figured in detail accruing in grinding operations.

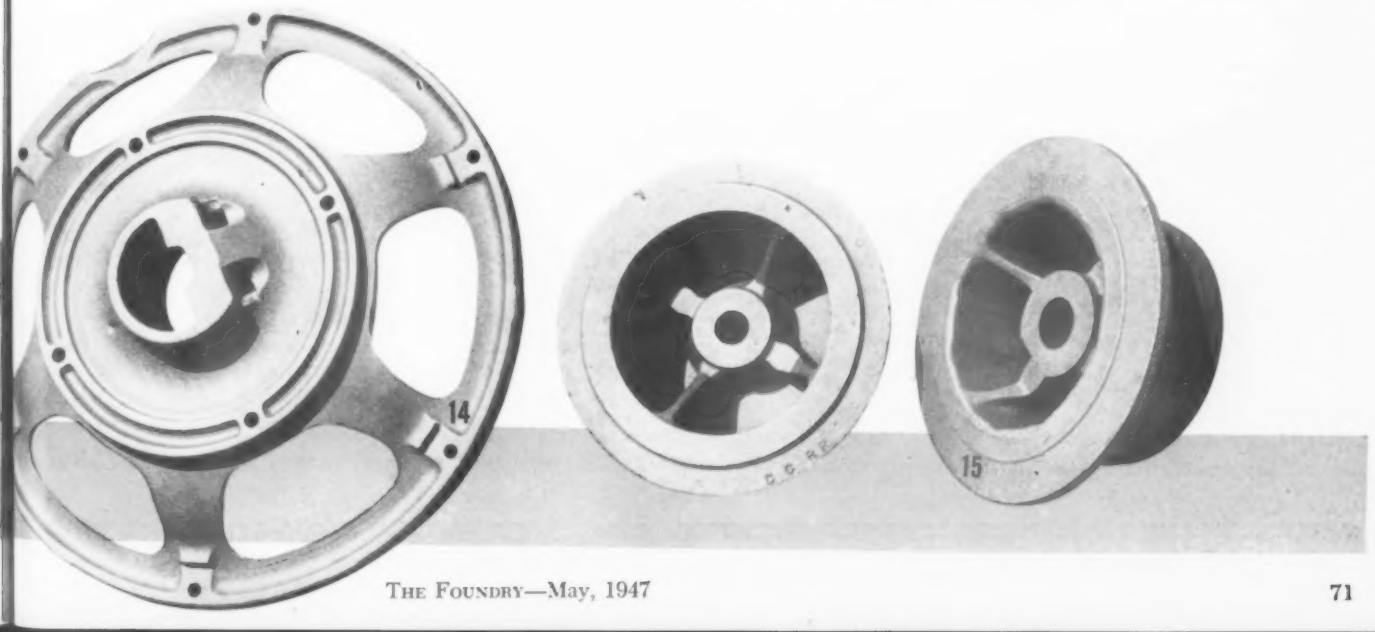
Increased production of castings resulting from the speedup in molding averaged about 17 tons daily the first month. Applying the total foundry burden factor, which is based on tonnage, this higher output is calculated to provide a daily saving of $136.

Aggregate of the four savings just listed is $618 daily. The company mixes about 1700 batches of sand per 24-hour day, and the supplies for the chemical treatment represent a daily average cost increase of about $170. Consequently the net saving per day is approximately $450.

Obviously, a longer period of time is necessary to provide a complete picture of the demonstrable savings from this new sand treatment, since the foregoing figures do not take into account the potential profit on the increased production of castings, the effect on number of scrap castings, and the possibility of lower cost of the chemical if and when large volume output is attained. And like any new product of this type, further study is being made which can lead to additional improvements and economies in practice.

At present Lynchburg Foundry Co. is using the chemically treated sand only in its mechanized system. Another unit, employing bench molding, and an additional molding department which is now being provided are expected to adopt the new sand later. The new molding department will use a sandslinger in floor molding of large castings.

Eastern Clay Products Co., Jackson, O., has exclusive rights to sale and manufacture of Westonite, and for a number of months has sponsored a research project on the subject at Battelle Memorial Institute, Columbus, O. Initial investigations were conducted to indicate the effect of chemically bonded sands on surface, fins, scabs, penetration, etc., and the program is being continued in an attempt to develop further improvements in the process.



Modernizes Malleable Iron Foundry

By ERLE F. ROSS
Chicago Editor
THE FOUNDRY

TO INCREASE production of gray iron and malleable castings required for its farm implement manufacture, Oliver Corp., Chicago, about two years ago initiated a program for expanding and modernizing its foundry facilities in South Bend, Ind. The malleable foundry was given priority and the new shop was completed in 1946, with operation commencing July 15. Work on the new gray iron shop has been under way for several months but it will be late 1947 before it is finished.

Both foundries formerly were and still are housed in one building under one roof, with the malleable unit occupying one end and the gray iron unit the other. Only major new building construction required in the modernization program was a storage and charging yard placed adjacent to the melting end of the malleable shop in such a manner as to serve the cupolas of both the malleable and gray iron foundries.

An outstanding feature of the new malleable foundry, and one being followed also in the gray iron shop, is maximum utilization of mechanical handling of raw materials, and conveyorization of molds, pouring operations and castings processing. Layout provides strict straight-line flow from raw materials to finished castings.

Malleable castings produced weigh from 4 to 12 lb each, with 7½ lb as the average. Melting and output of finished castings are practically double those of the old system.

Principal production units in the new foundry are two cupolas, a double-end air furnace, three molding and pouring lines, and three annealing ovens, in addition to a complete sand preparation and handling system.

The storage and charging yard is housed in a new steel frame building 112 ft wide and 270 ft long and is served by a 7½-ton overhead crane spanning the full width. Raw materials are brought in by freight cars on a siding running the length of the building. On one side of the yard are concrete bins for storing by-product and petroleum coke, various types of molding and core sands, silica sand and fire clay. In larger bins on the opposite side of the yard are concrete bins for segregated storage of various types of iron and steel scrap.

The charging yard proper, shown in Fig. 4, occupies

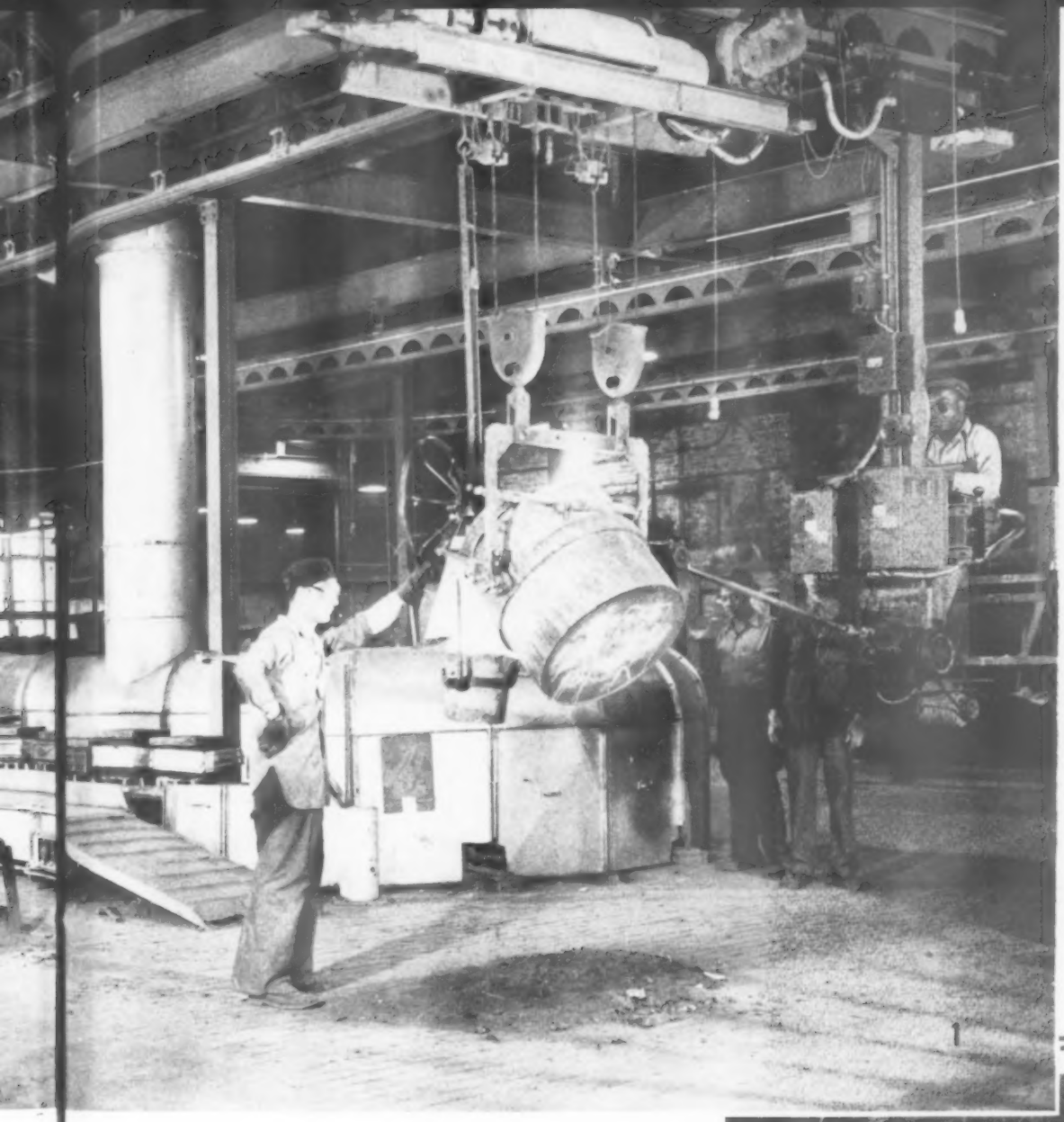


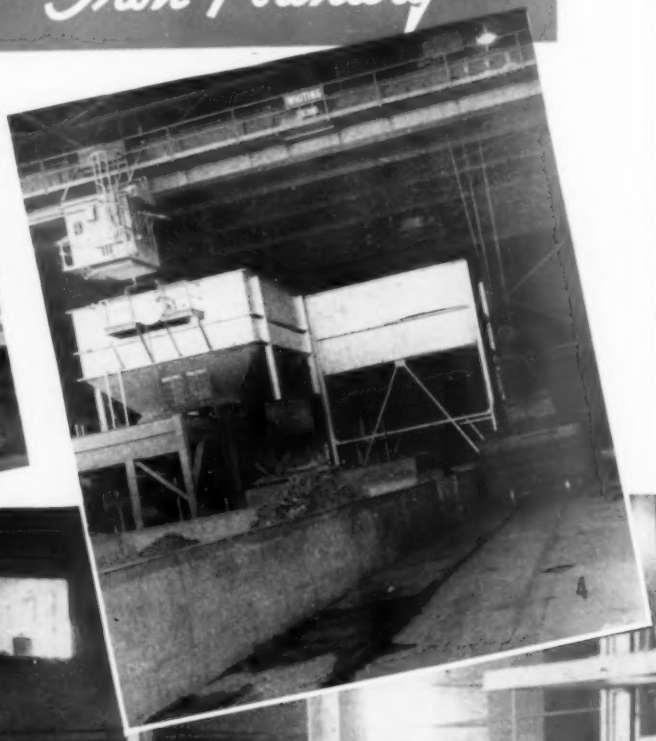
Fig. 1 — Pouring molds at new malleable iron foundry of Oliver Corp., South Bend, Ind. Poured molds are moved by conveyor through hood which removes gases and accelerates cooling

Fig. 2—At right is backside of one of the three shakeouts, with sand mullers and dust collector in background

an area about 70 ft wide and 75 ft long at the end of the storage yard closest to the foundry. In the center, all elevated, are an iron loading platform with batch-type weighing hopper equipped with weight dial, and coke and limestone hoppers. Flanking the iron loading platform and coke and limestone hoppers on the right are steel scrap and malleable sprue bins as well as the elevated coal hopper serving the air furnace pulverizers located immediately underneath; on the left are eight small concrete bins for foundry and malleable pig iron, sprue and special scrap.

Of the stockbins, the limestone hopper of 110 tons capacity is located in the center with a 55-ton coke hopper on either end. The three hoppers each have two bottom discharge points. In preparing cupola charges an electrically-operated two-bucket transfer car is moved under the iron loading platform. Pig iron and scrap is deposited by an electromagnet pickup into the batch weigh hopper below the platform and when proper charge weight is obtained as indicated on the dial scale overhead, the metal is dropped into the cone-bottom charging bucket on the

Modernizes Malleable Iron Foundry



transfer car. The car then is moved beneath the coke and limestone hoppers. Here the operator weighs out the required amounts of each in weigh hoppers with dial scales and drops them into the bucket.

The charge being completed, the operator runs the transfer car into the cupola charging bay where a 3½-ton underslung charging crane lifts the cone-bottom bucket from the car, deposits it on the wishbone of a cupola and drops the charge within. Fig. 9 shows the charging bucket about to enter a cupola. In addition to serving the two malleable cupolas, the charging yard, transfer car and charging crane also serve the four cupolas of the gray iron foundry, these units being located 55 to 120 ft to the left and in line with the malleable cupolas.

Spaced on 15-ft centers, the two malleable cupolas are each of 7 tons per hour capacity. Air is delivered to the cupolas at the rate of 3500 cfm, this supply being controlled by instruments. Two turboblowers mounted on a balcony to the left of the cupolas provide the air. Slag from the cupolas is run into water in a pit between the two units and is removed from the pit by a conveyor, the latter being shown in the foreground in Fig. 9.

Iron is taken out of the cupola at 2750 to 2800 F. Chemical composition is controlled carefully, since it makes for a short period in the air furnace if the iron composition is close to the malleable composition.

The air furnace, which stands adjacent to the cupolas but is separated from them by a brick wall, is of divided type with central stack. It is 77 ft long and 9½ ft wide. One end of this duplexing unit is shown in Fig. 8. Practice is to operate for four weeks on each end.

Hot iron from the two cupolas is transferred directly into either end of the duplexing furnace by an X-shaped trough passing through an opening in the separating brick wall. Flow of metal is directed and regulated by a system of dams and gates. Furnace burns pulverized coal. Two pulverizers, one serving as a spare, are provided in the charging yard underneath an elevated coal hopper.

Furnace holds 20 tons, and has capacity to pour 60 tons in eight hours, as compared with 30 tons in the old shop. Operating only eight hours each day, the furnace is started up in the morning two hours before use and is drained at night. Once a week, except for emergencies, the breast brick at the tap hole is replaced and the furnace is inspected. At the end of a four-week run, the bottom is relined.

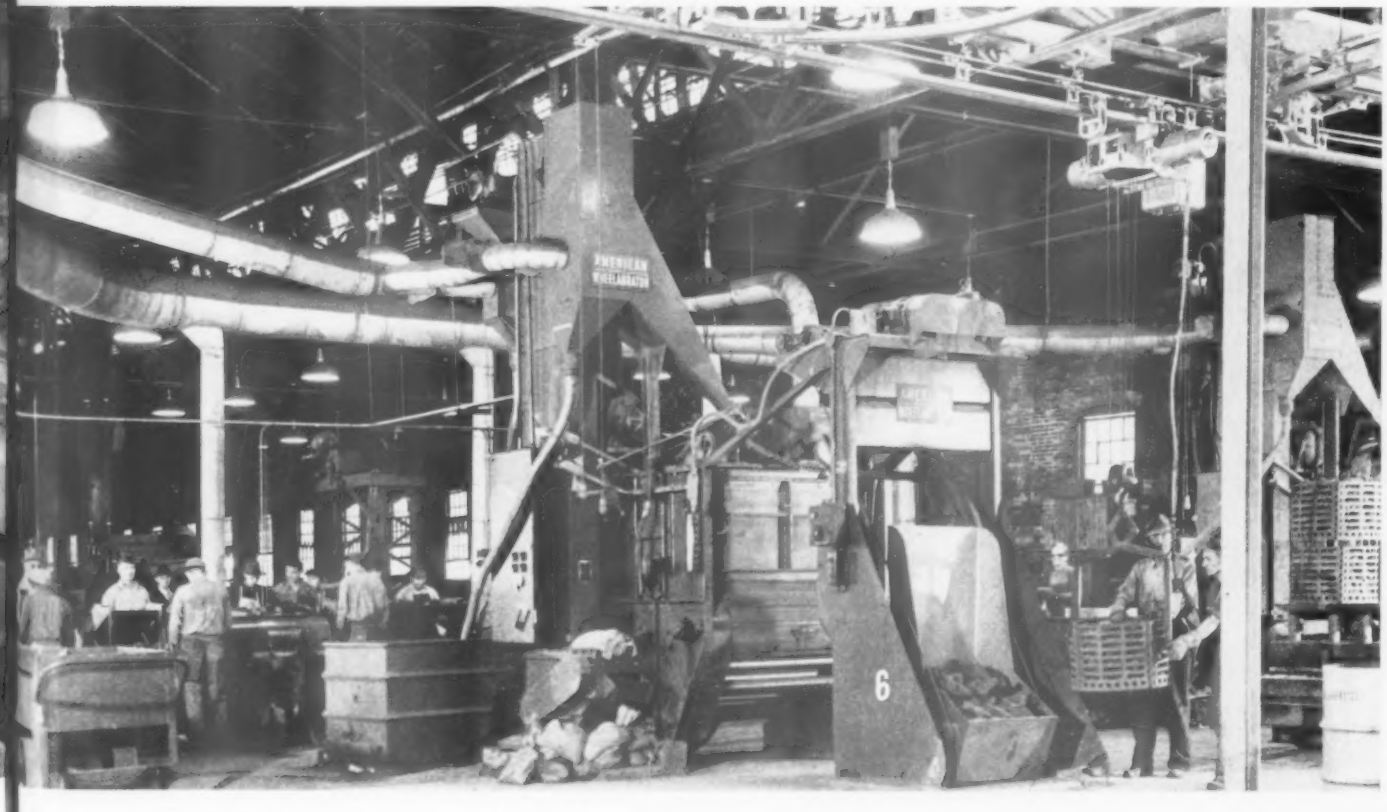
Metal is taken out of the air furnace at 2950 F and never below 2900 F. Phosphorus is maintained as close as possible to 0.10 per cent, this figure being critical in the annealing cycle. If phosphorus is over or under this amount, annealing is affected adversely. Complete chemical analysis for all elements is made first thing each morning; subsequently, analyses for silicon, manganese and

Fig. 3—One of the three electric annealing ovens showing carload of castings in high-alloy baskets being lowered from the overhead low-heat, or cooling chamber

Fig. 4—Storage and charging yard. Iron makeup platform above the scrap bin has dial scale mounted on the coke and limestone hopper. Charging bucket rolls underneath on a transfer car. Hopper at right stores coal for two pulverizers supplying air furnace fuel

Fig. 5—Castings moving from the shakeout on a long conveyor (background) on which they cool and are sprued, then transferred to this chipping and sorting conveyor

Fig. 6—One of two airless blasting machines in which castings are cleaned. Castings are delivered from the ovens by tramrail. High-speed grinders are shown in left background



Modernizes Malleable Iron Foundry

carbon are made every 30 minutes.

Molds are made on three molding lines, each 82 ft long and running parallel with the air furnace. Two of these lines are shown in Fig. 7. Unit 1, closest to the furnace, has ten jolt squeeze machines and two cope and drag machines for producing heavier work. The other two lines, Unit 2 and Unit 3, each has 13 jolt squeeze machines. The 37 molders make upwards of 8000 molds in eight hours, some molders putting up 245 molds daily on the average.

Each molder has his own brass checks stamped with the number of his molding unit and his machine in the unit, and he lays one of these checks on each mold he makes and deposits upon the conveyor. A girl at the end of the line removes and stacks these checks, so that a molder can always both count his own and be kept informed on his production.

Every facility is provided to save a molder's time and increase his production. He has his own overhead sand hopper and his own core rack which is kept filled. Bottom boards remain on the conveyor following shakeout ready to receive new molds. Hung on each side of the individual sand hoppers and supported by horizontal cables to minimize vibration are double fluorescent lighting units to eliminate all the shadows.

Live pattern and flasks are (*Please turn to page* 222)

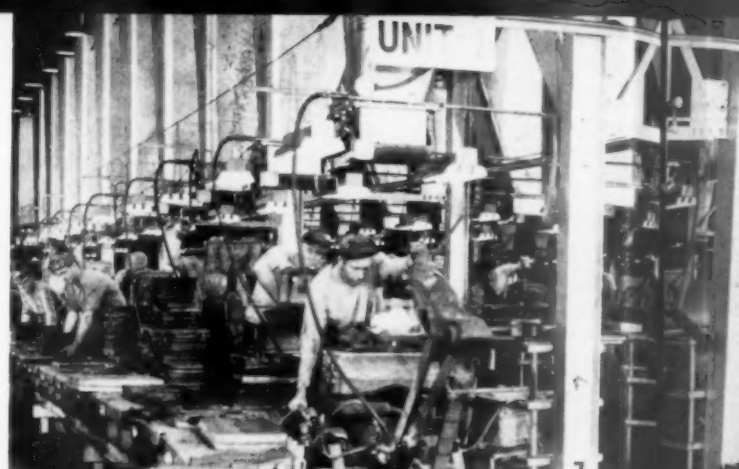
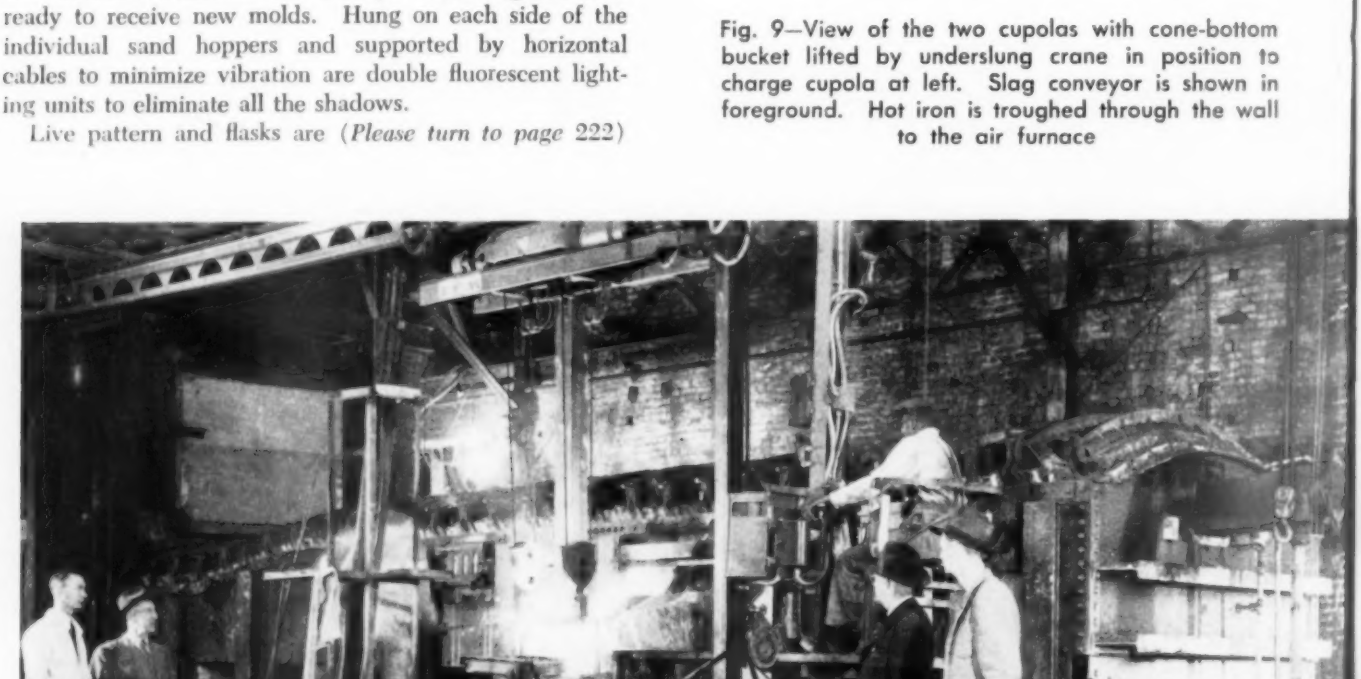
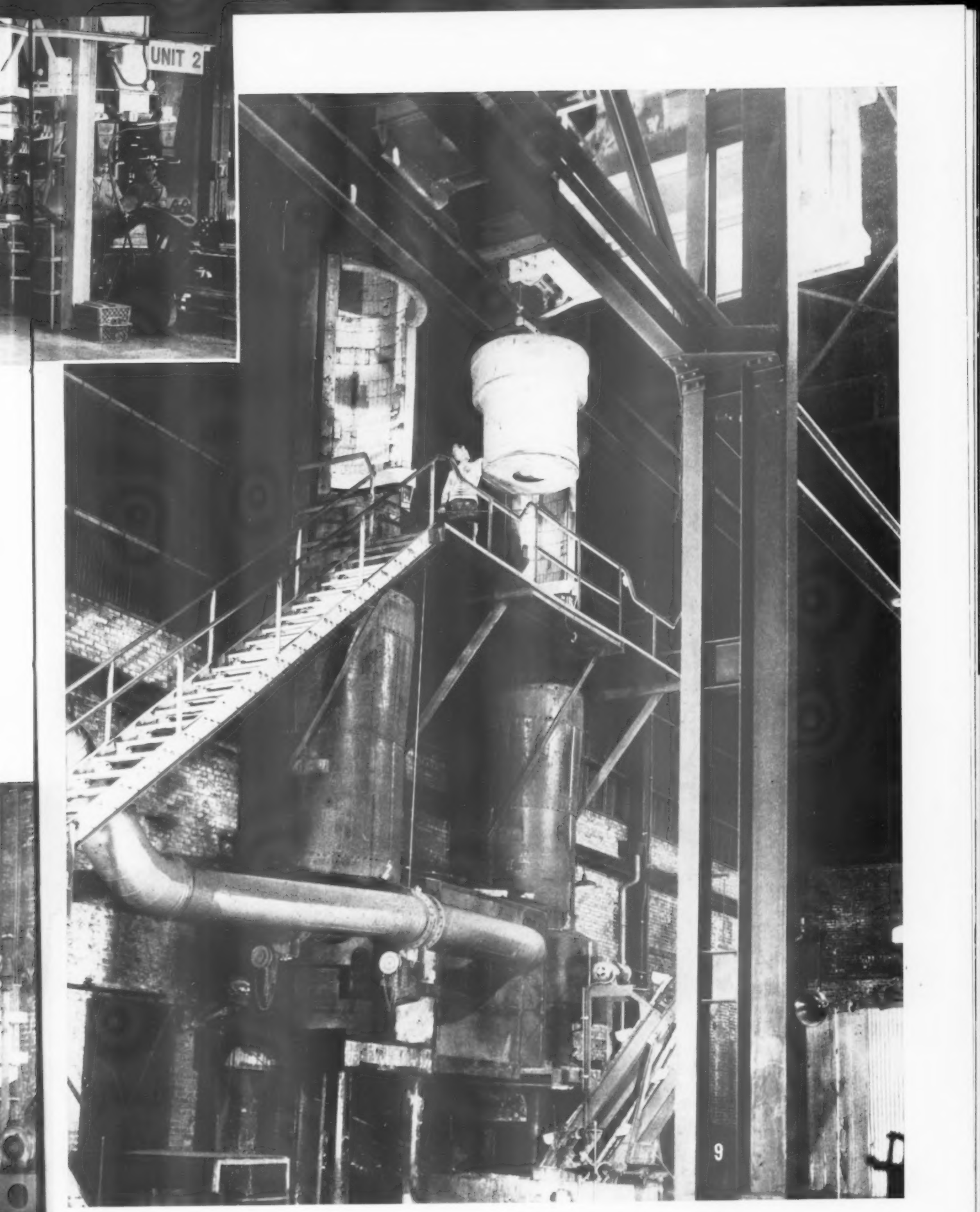


Fig. 7—Two of the three molding lines showing mold conveyor at left, overhead sand hoppers and double fluorescent lights over each molding machine

Fig. 8—Tapping air furnace iron into bull ladle handled by tramrail car. Oliver Corp. foundry personnel standing left to right are: John Guendling, engineer; George Shuman, foundry process engineer; Joseph Drain, superintendent of foundries, and W. V. Johnson, malleable foundry superintendent

Fig. 9—View of the two cupolas with cone-bottom bucket lifted by underslung crane in position to charge cupola at left. Slag conveyor is shown in foreground. Hot iron is troughed through the wall to the air furnace

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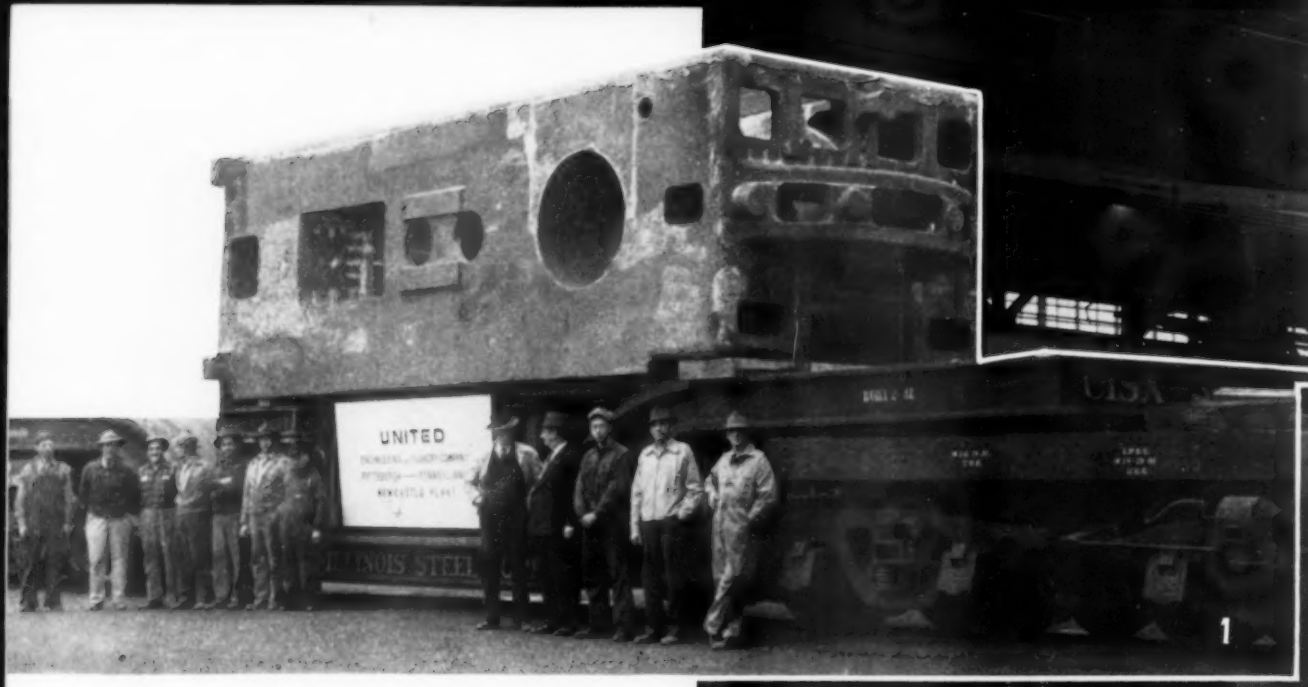


Fig. 1—A specially built car was employed to ship what is claimed to be the heaviest steel casting in existence

Fig. 2—Pouring the 300 tons of molten steel required 4-1/3 minutes exclusive of subsequent feeding

Fig. 3—Readying the pit in which the mold was made

Fig. 4—Pattern in place in the pit

Fig. 5—Showing the mold after drying

Fig. 6—Removing the last sinkhead from the casting with a cutting torch

MAKING A 232-Ton Steel C

RECENTLY completed and shipped from the New Castle, Pa., plant of the United Engineering & Foundry Co., Pittsburgh, is what is claimed to be the largest and heaviest steel casting in existence. The 232-ton casting shown in Fig. 1, made to the order of the Ajax Mfg. Co., Cleveland is a frame for a 6000-ton capacity, high-speed, mechanical forging press.

The pattern of the casting, made by the Eclipse Pattern Co., Pittsburgh, required over 30,000 ft of lumber, almost a carload; 500 lb nails and 10 gal shellac. More than 2500 man-hours of labor were required to build it. In the foundry over 625 tons of specially prepared sand formed the mold and 3600 man-hours of labor were required in this operation. The mold was made in a pit in the floor 18 x 39 ft and 16 ft deep. For a period of seven days and nights hot air was circulated and recirculated by recirculating portable mold dryers through the huge mold cavity.

Four open hearth furnaces supplied the 300 tons of steel required to fill the mold, the gates and the sinkheads. Metal was poured simultaneously from four ladles suspended from four overhead electric traveling cranes in a period of 4-1/3 minutes. Later at several intervals an additional 50 tons of molten metal was poured into the sinkheads to compensate for shrinkage.

The casting remained in the sand for two months after it

2

3

4

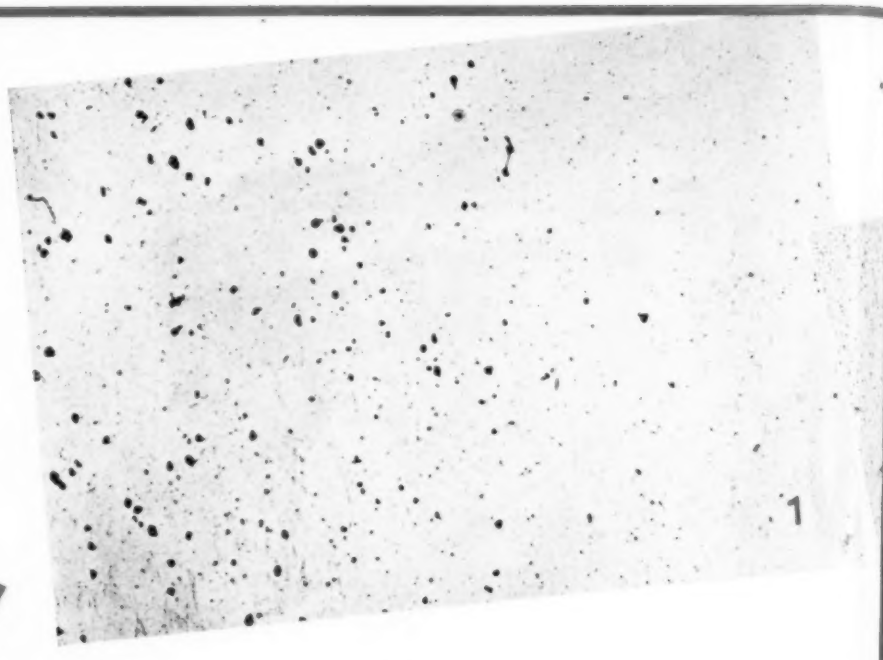
5

6

Casting

was cast. Another month was spent in stripping the casting, cleaning the surface and in removing the cores, gates and risers. For shipment the casting was loaded on a specially built car with 12 wheels under each end. This is in contrast to the ordinary flat car approximately half the length and with only four wheels under each end. A special train was made up to transport the unusual load of 400 tons including car, casting and blocking. The train included a locomotive, three empty flat cars and the loaded car. The three empty cars separated the locomotive and loaded car so that both never would be on a bridge at the same time.

This first of a series of articles based on investigations sponsored by the Non-Ferrous Ingot Metal Institute has for its primary objective the presentation of a correlated account of the problem of unsoundness resulting from gas evolution during the solidification of copper-base alloy castings



Unsoundness CAUSED BY GASES In Copper-Base

THE problem of gases in copper-base alloys is important because it is one of the main factors which determine the soundness and properties of copper-base alloy castings. Consequently, a great deal of work has been done on the causes and control of the unsoundness in copper-base alloys resulting from the evolution of gas during the solidification of the casting. Such investigations are difficult because there is no easily applied method of obtaining quantitative data on the amounts and identities of the gases evolved.

It is to be expected, therefore, that the value of a great deal of work has been seriously impaired, because either the measuring stick employed to estimate the quantity of gas was faulty, or the measuring stick indicated that all of the melts prepared were of low quality; i.e., of relatively high gas content. In addition, there are some differences of opinion among those who have made competent investigations of the subject; therefore, the primary objective of this paper is the presentation of a correlated account of the problem of unsoundness resulting from gas evolution during the solidification of copper-base castings. A further objective is to describe the problem as completely and precisely as existing information will permit.

Types of Unsoundness Produced by Gas Evolution—As in aluminum-base and magnesium-base alloys, gas evolution in copper-base alloys produces two types of unsoundness of which one may grade into the other. These two types of unsoundness are as follows:

1. *Pinholes.* Pinholes are produced by gas evolution, and their formation is favored by a high gas content of the melt. These pinholes are small, generally more or less equiaxed voids ⅛-in. in diameter or less. The gas is precipitated in the form of small bubbles in the solidifying melt, and some of these bubbles may be trapped in the casting. If the bubbles form in liquid, the cavities are rounded, but when a considerable amount of solid is present and some of the solid dendrites form a portion of the boundaries of the pinholes, the cavities will be somewhat angular.

In general, the more rapid the solidification, the smaller the resulting pinholes. An example of small, rounded pinholes in a cast-to-shape test bar of 85-5-5-5 alloy is shown by Fig. 1. These small, rounded holes result

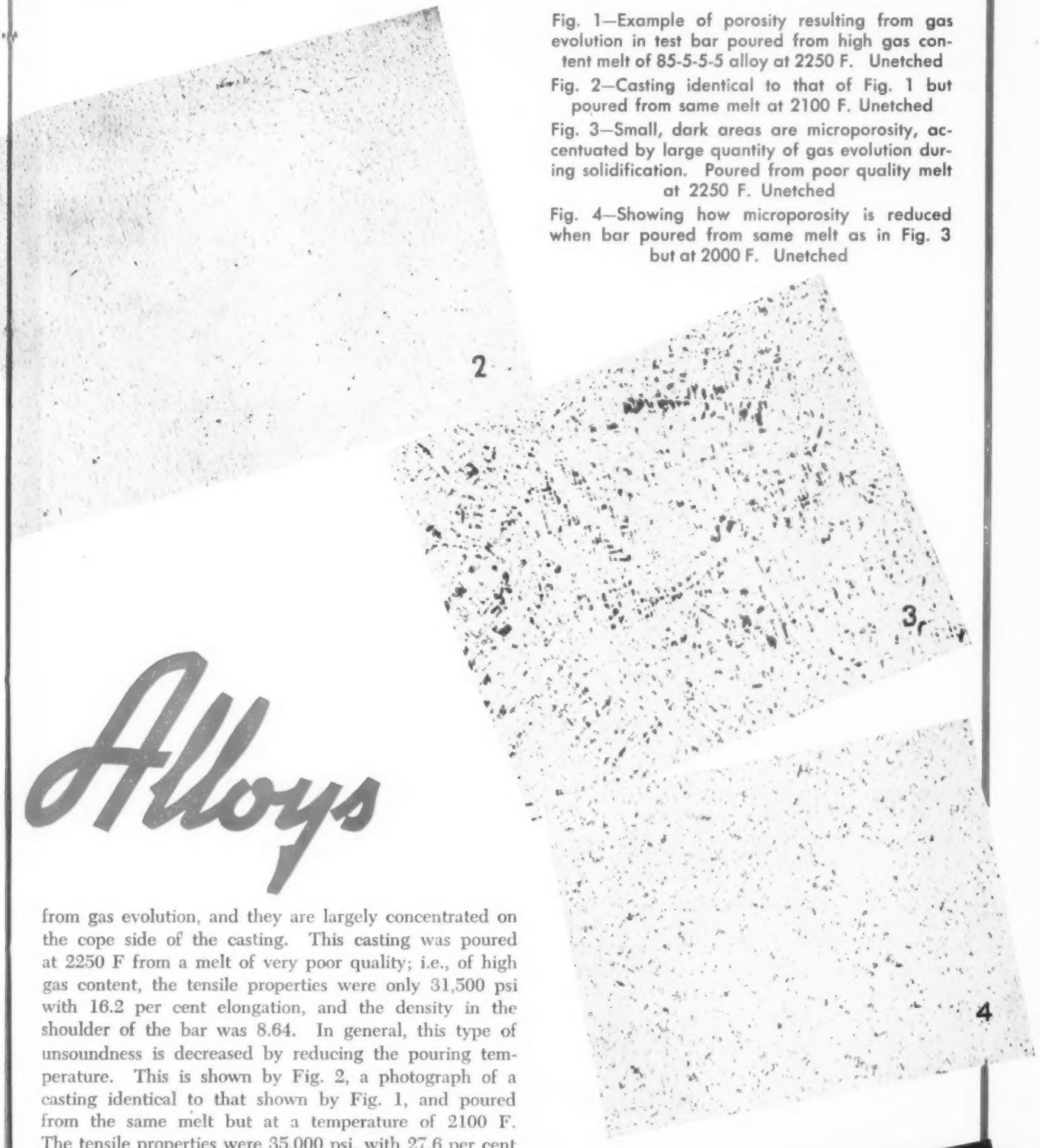


Fig. 1—Example of porosity resulting from gas evolution in test bar poured from high gas content melt of 85-5-5-5 alloy at 2250 F. Unetched

Fig. 2—Casting identical to that of Fig. 1 but poured from same melt at 2100 F. Unetched

Fig. 3—Small, dark areas are microporosity, accentuated by large quantity of gas evolution during solidification. Poured from poor quality melt at 2250 F. Unetched

Fig. 4—Showing how microporosity is reduced when bar poured from same melt as in Fig. 3 but at 2000 F. Unetched

e Alloys

By L. W. EASTWOOD
Assistant Supervisor
and
J. G. KURA
Research Engineer
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from gas evolution, and they are largely concentrated on the cope side of the casting. This casting was poured at 2250 F from a melt of very poor quality; i.e., of high gas content, the tensile properties were only 31,500 psi with 16.2 per cent elongation, and the density in the shoulder of the bar was 8.64. In general, this type of unsoundness is decreased by reducing the pouring temperature. This is shown by Fig. 2, a photograph of a casting identical to that shown by Fig. 1, and poured from the same melt but at a temperature of 2100 F. The tensile properties were 35,000 psi, with 27.6 per cent elongation, and the density was 8.82 g per cubic centimeter. This accentuation of pinhole porosity with increasing pouring temperature of copper-base alloy is exactly analogous to the similar phenomenon associated with aluminum-base alloys.

2. *Microporosity.* Alloys of aluminum, magnesium, and copper which solidify to form a substantially solid solution are susceptible to the defect known as microporosity. The influence of alloy composition has been discussed fully elsewhere,[1] and it is sufficient to point out here that microporosity is increased by the follow-

ing: (1) increased solidification range, (2) decreased amount of eutectic or other liquid freezing at constant temperature at the end of solidification, (3) decreased degree of directional solidification as affected by decreased temperature gradients towards the feed head, and (4) increased gas content of the melt.

It will be noted that the first two are a function of alloy composition; the third, a function of casting design, and method of gating, risering, and chilling; while the last is a function of melt quality. Furthermore, it is apparent that, for a given alloy, the defect known as microporosity is eccentuated not only by increasing amounts of gas evolution during solidification, but also by the decreased feeding as determined by the casting design and the gating practice employed.

Aside from the lead content, most copper-base alloys are the solid-solution type and are, therefore, susceptible to the formation of microporosity. In general, they not only contain little or no eutectic, but have a wide solidification range, and both of these factors tend to promote the formation of microporosity in the castings. This paper will not deal in any way with the problem of proper feeding as dictated by casting design, gating and risering practice, but will be entirely confined to the effect of the gas evolution during solidification upon the amount of microporosity formed. It should be emphasized, however, that gas evolution during solidification is only one of the three most important factors determining the amount of microporosity in copper-base alloy castings.

The effects of gas evolution during solidification, and the effects of pouring temperature on the occurrence of microporosity in 85-5-5-5 alloy are illustrated by Figs. 3 and 4. The small, dark areas in Fig. 3 are the voids constituting microporosity in a Webbert-type test bar of 85-5-5-5 alloy poured at 2250 F. A melt of high gas content was employed, resulting in a considerable amount of gas evolution during solidification, which, in turn, accentuated the unsoundness in the form of microporosity. The tensile properties are 31,000 psi and 17.7 per cent elongation, with a density of only 8.5 g per cubic centimeter.

Fig. 4 is identical to Fig. 3, except that it represents a test bar poured from the same melt at 2000 F. The tensile properties are 38,900 psi, with 33.9 per cent elongation, and the density is 8.80 g per cubic centimeter. It will be noted that the reduction of the pouring temperature has almost entirely eliminated the microporosity, and this effect of pouring temperature on the occurrence of microporosity is representative. Improved properties, however, do not always accompany the decreased pouring temperatures and reduced amount of microporosity. This subject will be considered in a later paper.

Having observed the defects which are produced by gas evolution during solidification, the next consideration will be the types and kinds of gas evolution.

Types and Kinds of Gas Evolution—The problem of gas evolution in copper-base alloys is considerably more complex than that of gas evolution in the aluminum- and magnesium-base alloys. Aluminum and magnesium have a very marked affinity for oxygen or oxidizing materials. They also have considerable affinity for nitrogen, forming nitrides which probably are insoluble, at least in aluminum. Accordingly, such gases as nitrogen, oxygen, carbon monoxide, carbon dioxide, and sulphur dioxide combine directly with the melt, to form insoluble compounds harmless as sources of gas unsoundness. Furthermore, because of the very high stability of the oxides, they cannot react with reducing materials. Thus, it would not be likely that a reaction would occur between Al_2O_3 and carbon or aluminum carbide to form carbon monoxide, even though the Al_2O_3 had slight solubility in the melt.

Hydrogen Gas Cause of Unsoundness

The only common gas which is likely to participate in gas evolution is the strongly reducing one, hydrogen. Hydrocarbon gases as such are not likely to be a source of difficulty in aluminum and magnesium melts because, if any of the hydrocarbon gases were in solution, they probably would decompose, at least partially, to form a carbide and to liberate hydrogen. The hydrogen, if liberated in atomic form, could then be absorbed as such into the melt. Thus, a common-sense consideration of the problem indicates that hydrogen in solution in the melt can be the only gas causing unsoundness in aluminum and magnesium alloys. Experimental and commercial experience confirms this conclusion.

On the other hand, copper-base alloy melts offer a considerably greater degree of complexity. In the first place, their reducing characteristics vary from that of pure copper, which has a very high solubility of oxygen or oxide in the melt, to fairly strongly reducing melts containing phosphorus or zinc in which only slight quantities of oxygen or oxide are soluble. In any event, the entire series of copper-base alloys has a variable solubility for oxygen or oxide in the melt, depending upon the amount and identity of the alloying elements and impurities in it. This dissolved oxygen or oxide can take part in reactions resulting in gas evolution. Hence, it is evident that, while there apparently is only one type of gas evolution in the strongly reducing alloys of aluminum and magnesium, there are two likely types of gas evolution in copper-base alloys. These two types of (*Please turn to page* 200)

TABLE 1—Amount of Gas or Gas Former Required To Precipitate by Type 1 Gas Evolution or React in Type 2 Gas Evolution To Produce 1 Per Cent Voids at 1900 F in a Solidifying Copper-base Alloy Having a Density of 8.6 Grams Per Cubic Centimeter at 1900 F ***

Gas or Gas Former	cc per 100 Grams*	Per Cent by Weight
TYPE 1 GAS EVOLUTION		
H_2	0.0242	0.0000022
CO	0.0242	0.0000302
CO_2	0.0242	0.0000475
SO_2	0.0242	0.0000692
N_2	0.0242	0.0000302
TYPE 2 GAS EVOLUTION**		
H_2 —Reaction A	0.0242	0.0000022
S —Reaction B	.....	0.0000346
C —Reaction C	.....	0.0000130
CO—Reaction D	0.0242	0.0000302

*Measured at 32 F and existing atmospheric pressure.

**Also 0.0121 cc of O_2 or 0.0000173 per cent oxygen by weight is required for Reactions A, C, and D; 0.0242 cc or 0.0000346 per cent of O_2 is required for Reaction B to form a precipitated gas causing 1 per cent voids.

***Assuming the gas in the voids is at atmospheric pressure. Actually the pressure might be more, in which case proportionately more gas would be required than the figures given to produce 1 per cent voids.

The author gives three good reasons why there are excellent opportunities in the foundry industry today. This paper was presented before the Western Michigan Chapter of the American Foundrymen's Association

Elbow Room in the foundry?

By CLEMENT J. FREUND
Dean of Engineering
University of Detroit

YES, I am sure there are opportunities in the foundry industry, excellent opportunities. Let me give you three reasons why I think so.

Some years ago I worked for the Falk Corp. at Milwaukee, and one of my assignments was to recruit boys for the corporation's college apprentice program. One day a young man alighted from a gorgeous and expensive convertible coupe just outside my window and immediately appeared in the office. His manners and speech were excellent, and his clothes looked as if he had taken them out of *Esquire*. He put down his hat and peeled off his exquisite, pigskin gloves. He told me that he had just graduated from college—a swank institution of the Atlantic seaboard—and that he would like to become an apprentice. I explained all about schedules, contracts, spread of experience and such, and then asked him in which department of the business he would like to be trained.

"In the steel foundry," he replied.

I looked over his lily-white hands, and other evidence of about 22 years of pampering; "No, I don't think that is the place for you." But he insisted, and I asked him why.

"Because I don't know anybody who is going into the foundry, and I won't be bothered by competition from half a hundred college graduates, all of them just as well prepared as I am." That explains one reason for foundry opportunity.

And the situation has not changed very much. Not long ago we checked 185 senior students of metallurgical and mechanical engineering in the University of Michigan, Michigan State College, and the University of Detroit. 145 of them, or 78 per cent, had never even thought about a foundry career.

The same motive prompts the groceryman to set up his business where there are few stores, or none. A hundred years ago, people migrated west of the Mississippi to get away from the crowds, and to seek opportunity in the great spaces. And I take my vacation far beyond the Soo, where fishermen are few and far between.

The boys still avoid the foundries. "Work in a foundry? Me? No Sir-ee. My grandfather was a molder. He told me a hundred times never even to go near a foundry." Parents, uncles, teachers, clergymen and local wise men and philosophers in the industrial towns tell the boys to stay away from the foundries. And the boys have all but unanimously heeded the advice.

The population of boys in the foundries is pretty thin, but the whole industry lies wide open before each one of them. They have the field to themselves.

Research in the Foundries—The second reason for large opportunities in the foundry industry is the current, sharply accelerated interest in research. Except for research we should, of course, have lost the war, and you and I would be eating turnip roots and the heads of fishes behind barbed wire; or we would be dead. The Magnuson, Kilgore, Senate 1850 and other bills in Congress indicate that Americans are concerned about research, and the owners and managers of smaller industries are beginning to inquire about taking advantage of research facilities in the colleges of engineering.

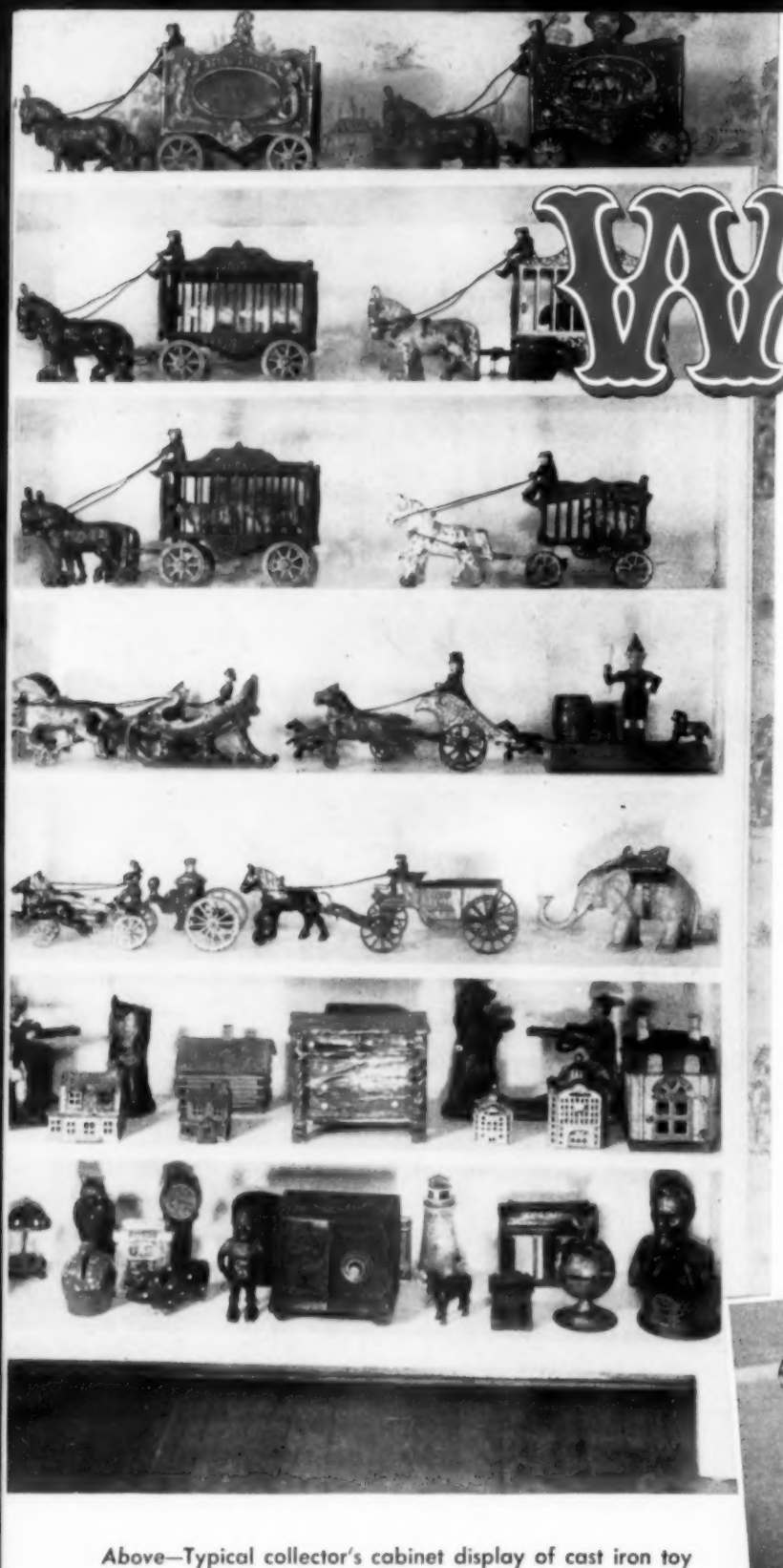
When they are depressed and wax confidential, foundrymen envy the consistent prosperity of organizations like General Electric, Bell Telephone, Chrysler, General Motors. Perhaps the foundrymen would do well to investigate Whitney and Langmuir's House of Magic, Jewett's Bell Laboratories, Zeder's great engineering laboratories and Kettering's famous research division.

There has been some foundry research, of course. Certain foundry corporations have done a superb job. The foundry associations have organized research movements, the universities have co-operated, and excellent work has been done by institutes like Battelle and Mellon. But foundry research has been a mere drop in the ocean. American industries on the whole were spending 6 per cent of net income for research in 1941. I am certain that the foundries expend much less.

In order to hold their own against the welders, the forgers and other competitors, American foundrymen will soon go in for research in dead earnest, and when they do, they will create countless opportunities for young men.

I don't mean that there will be thousands of jobs in the research laboratories. That kind of work is highly specialized and requires a rigorous kind of training which is beyond the average young (*Please turn to page* 252)

Where are the Toy Banks o



Above—Typical collector's cabinet display of cast iron toy banks, miniature circus wagons, fire engines and other objects. *Right*—Two views of a toy bank in which dropping a penny in the slot causes the three figures to revolve. The lower view shows the simple mechanical equipment. *Far right*—In the first a penny cures the small darkie's dilemma. The second shows other types of banks actuated by penny deposits

This is the second and concluding article on the subject of cast iron toy banks. Illustrations are from the collections of Wilmer H. Cordes, Cleveland, and Andrew Emerine, Fostoria, O. Historical and other data from Cavalcade of Toys, are presented by courtesy of the authors, Ruth and Larry Freeman, Century House, New York

...ks of Yesteryear?

By PAT DWYER
Engineering Editor
THE FOUNDRY

TO THE average person there is something very pathetic about old toys, either singly or in collections. Faint nostalgic memories of Eugene Field's "Little Boy Blue" lurk in the background. The little toy dog is covered with rust, yet sturdy and staunch he stands. The little toy soldier is red with rust and the musket molds in his hands. Time was when the little toy dog was new and the soldier was passing fair. That was the time Little Boy Blue kissed them and put them there. The years are many. The years are long **** Aye. Too many and too long.

Worn and apparently useless toys frequently were retained by a fond mother through one generation. Those into whose hands they fell later know nothing of their origin. There is one comforting thought. The collector who snatched them from the discard is a sympathetic soul and the people who originally loved the dolls and toys, if they were alive, probably would be very glad their cherished possessions had fallen into such good hands.

Back in the so-called good old days, when thrift was cultivated and extolled as a positive virtue and every child was influenced, exhorted and in some instances coerced into saving his or her pennies, several alert inventors sensed an opportunity to turn an honest penny. Shortly afterward several foundries were competing and striving to produce the most attractive and therefore best selling mechanical bank.

These clever and interesting mechanical units were constructed of intricate parts and timed to perform their respective stunts with promptness and precision. They were sold through the general store of the period as toy banks and presented to the boy or girl usually expecting a different kind of a Christmas gift. The first faint apostasy, first heretical whispers touching on the Santa Claus legend seem to have started about this period.

Competent authorities estimate that over 600 different varieties of toy banks were made and of these varieties many thousand banks were sold and distributed between 1875 and 1910. Of this total some 260 models were equipped with moving parts. These became known as mechanical banks to distinguish them from the other styles known as still banks. A large number of the designs were patented as early as 1868 and continuing up to about 1895.

Considering the fact that all the early banks were strictly hand made and individually hand painted and decorated, the investigator is truly amazed at the exceedingly low selling price. Mr. Einstein probably could explain this phenomenon as a relatively minor feature of relativity—or something. While (*Please turn to page* 226)

WHAT KIND OF Patterns

In this third and concluding article discussing the proper selection of pattern equipment for production of different sizes and quantities of castings, equipment for large quantity, long production runs is described. The material is from a special report prepared for the Steel Founders' Society of America

PREVIOUS articles in this series described pattern equipment for jobbing quantities of various size castings. This present discussion is concerned with large quantity, long production runs where more rapid production is needed to meet the customer's delivery requirements.

Some high-production foundries use special procedures such as making castings in assembled cores, which requires a production line for core assembly. However, the following data and examples relate to means of obtaining high production in general jobbing foundries.

Compare Fig. 9 (THE FOUNDRY, March) with Figs. 25 and 26. Note the similarity to the treadlink job (represented by the latter) with its multiplicity of cores. Even though the cores are blown they require considerable time in the coreroom as well as in the molding department.

Figs. 27, 28, 29 and 30 illustrate the same job as shown in Figs. 25 and 26, using redesigned pattern equipment which eliminates much time in the coremaking, molding and cleaning departments. Another example of redesign of pattern equipment to obtain higher production rates is illustrated in Figs. 31, 32 and 33. Fig. 31 shows the original cope and drag patterns. Fig. 32 is the corebox which makes a unit core in one blow. No wires are required and a vent is formed by the removable rod. The core is baked on an aluminum drier. This core formerly was made in halves, with one baked half being used as a drier for the "green" half.

Increased production of small cores can be achieved by using multiple coreboxes made into a single unit. Fig. 34 illustrates a four-piece corebox that makes 24 cores in one blow. This is especially desirable when there is a rush demand for large quantities. Multiple core production may be increased as shown in Fig. 35, which shows a power-jolt, hand rollover and draw machine equipped with a corebox which in one operation makes 36 cores, constituting one entire plate of cores.

High production necessitates consideration of not only the pattern equipment but also machine equipment and manpower. For larger molds, suitable equipment is mandatory. Figs. 37 and 38 show a large job requiring a 42 x 54 x 9 in. flask section each for the cope and the drag. By using a 10,000-lb rollover machine, served by a sand-slinger, for both the cope and drag, 100 units can be produced in eight hours with very few men.

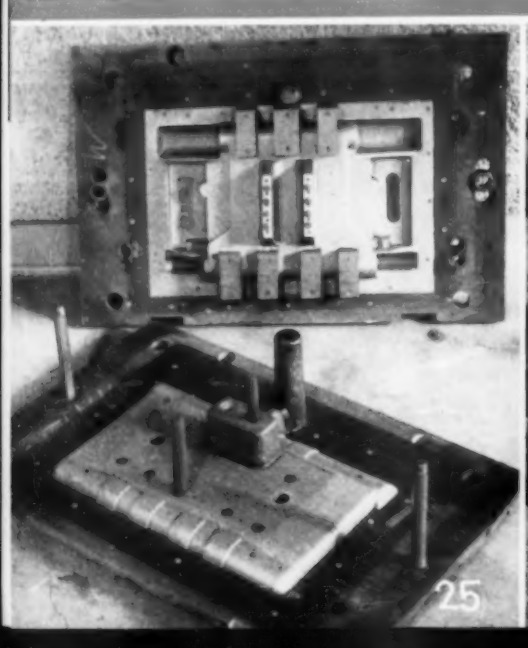


Fig. 25—Complicated cope and drag equipment requiring multiple cores

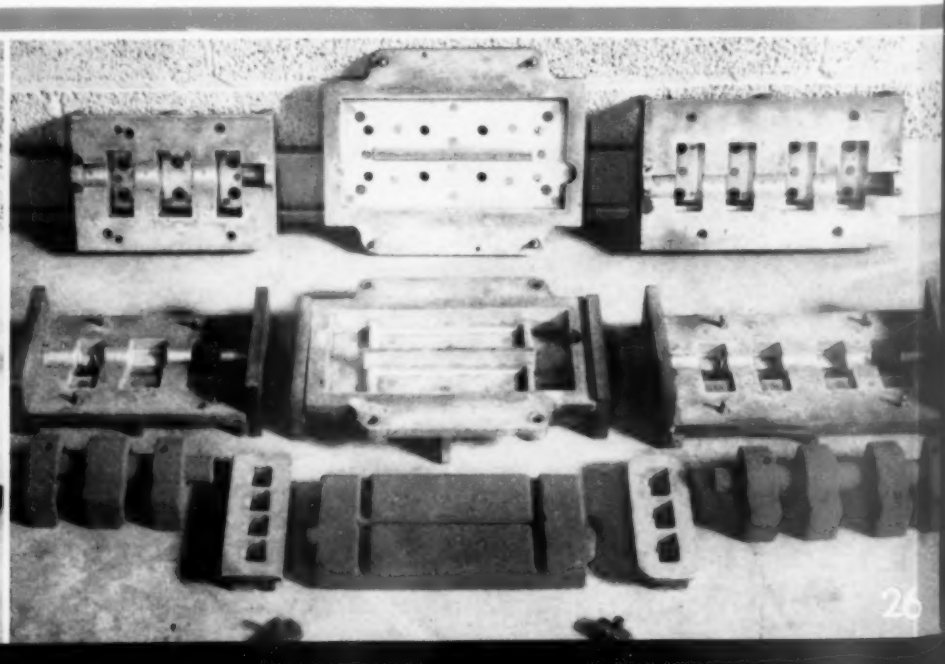


Fig. 26—Metal coremaking equipment and cores for cope and drag shown in Fig. 25

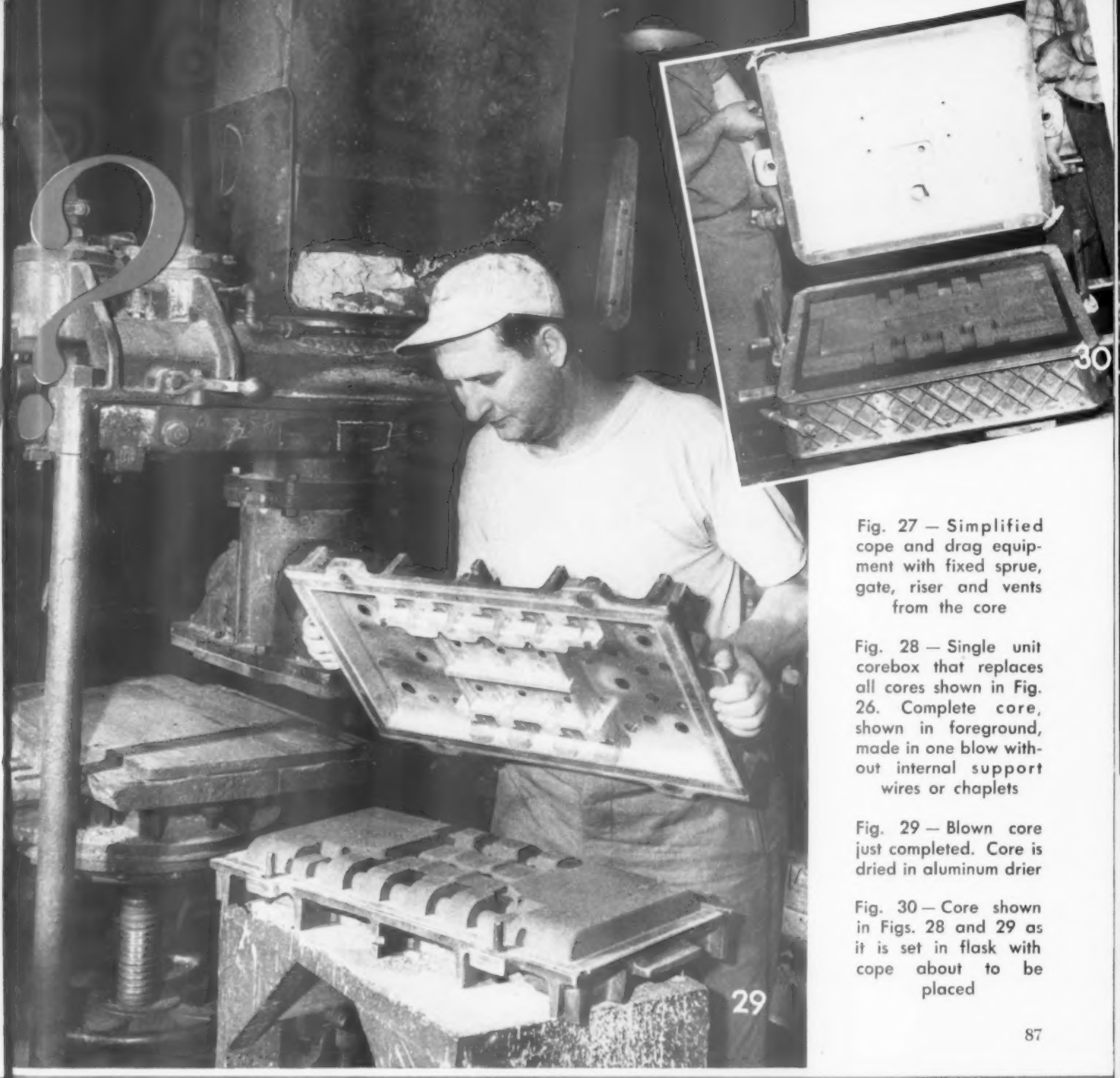
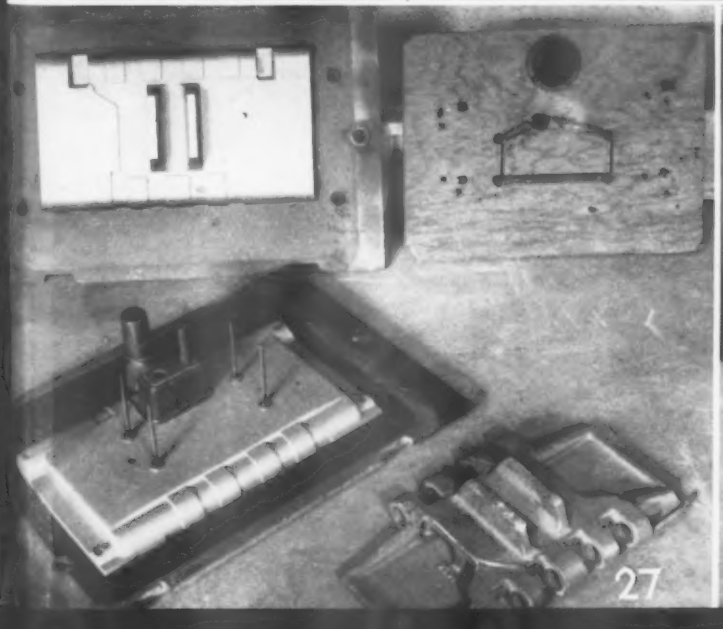


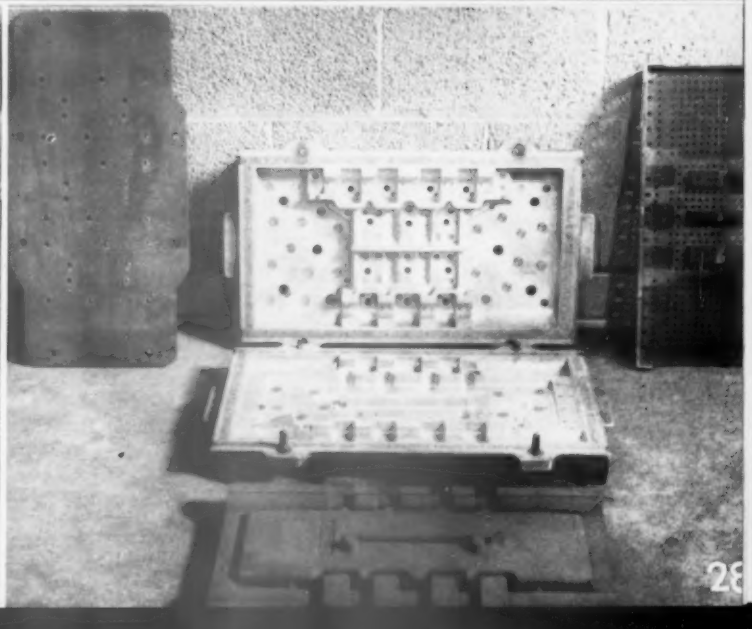
Fig. 27 — Simplified cope and drag equipment with fixed sprue, gate, riser and vents from the core

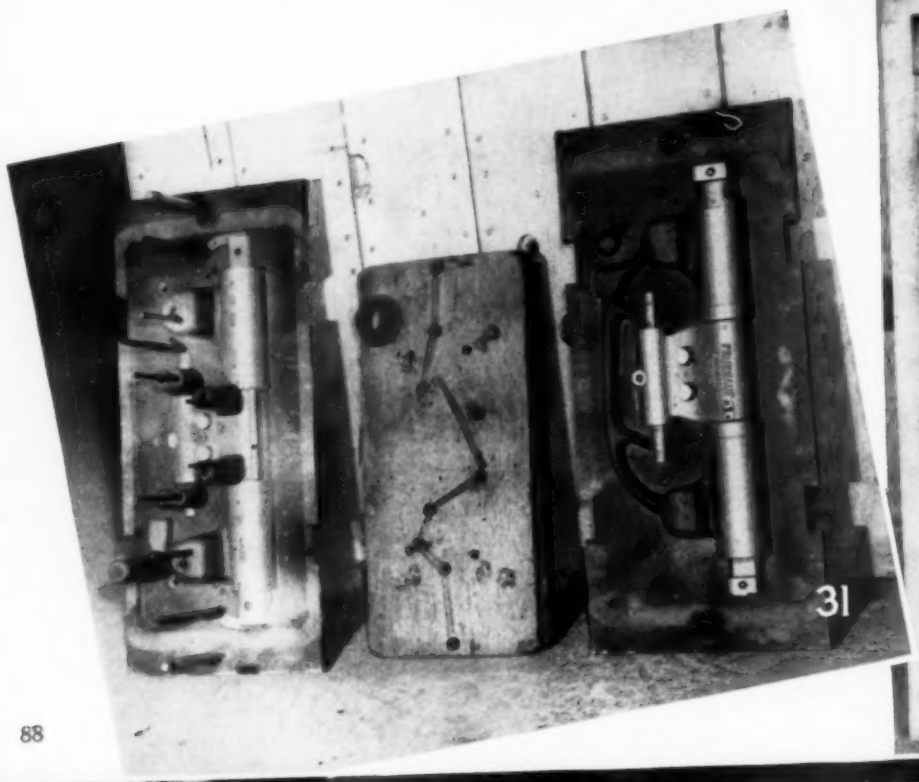
Fig. 28 — Single unit corebox that replaces all cores shown in Fig. 26. Complete core, shown in foreground, made in one blow without internal support wires or chaplets

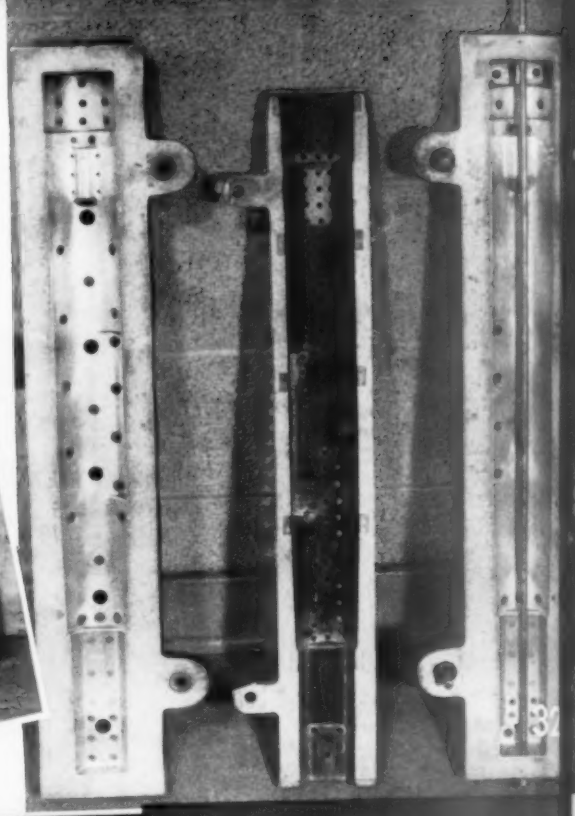
Fig. 29 — Blown core just completed. Core is dried in aluminum drier

Fig. 30 — Core shown in Figs. 28 and 29 as it is set in flask with cope about to be placed









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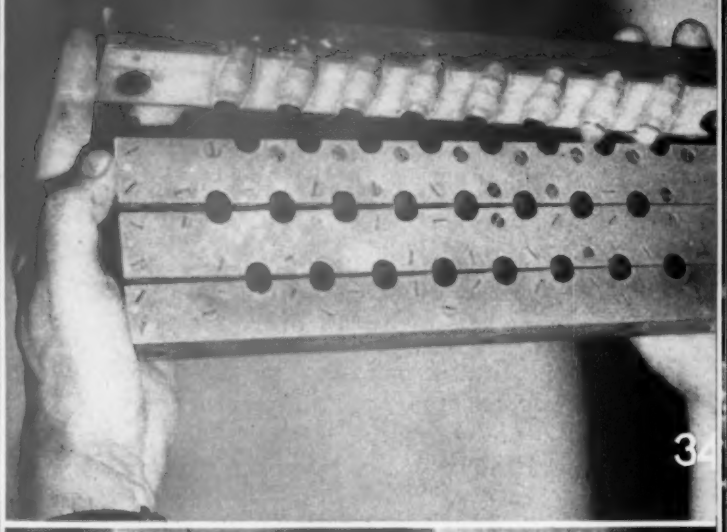


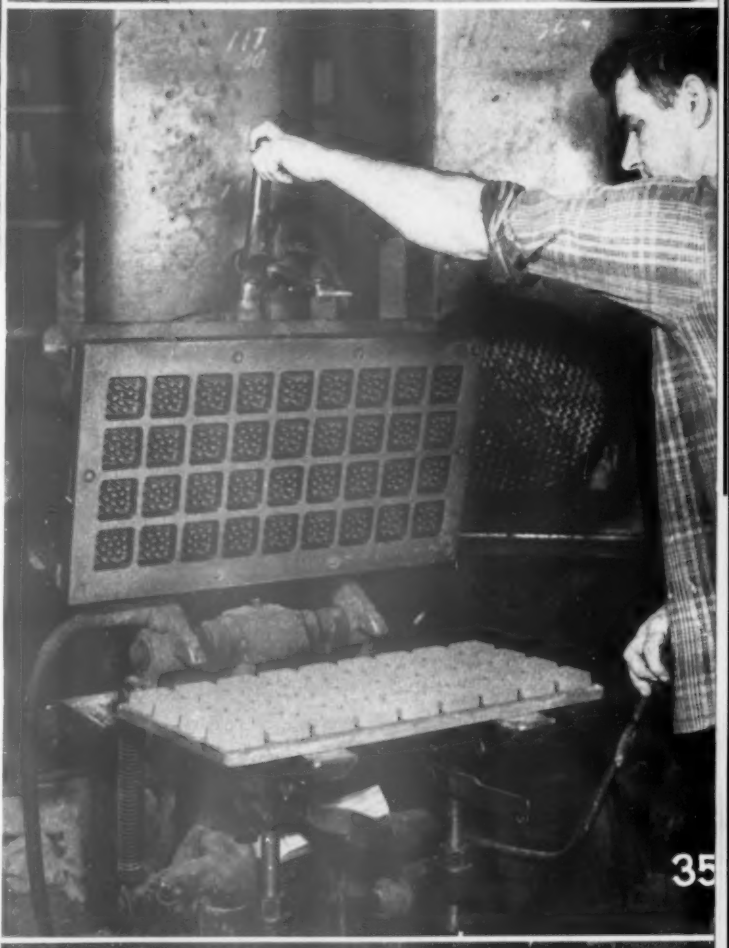


Fig. 31—Simplified pattern equipment similar to that shown in Fig. 27, with fixed sprue, gates, riser vents and pouring cup

Fig. 32—Corebox which makes unit core in one blow. Center piece is the aluminum drier. Note removable vent rod for center of the core

Fig. 33—Coremaking equipment shown in Fig. 32 in operation. Operator is placing drier over the blown core

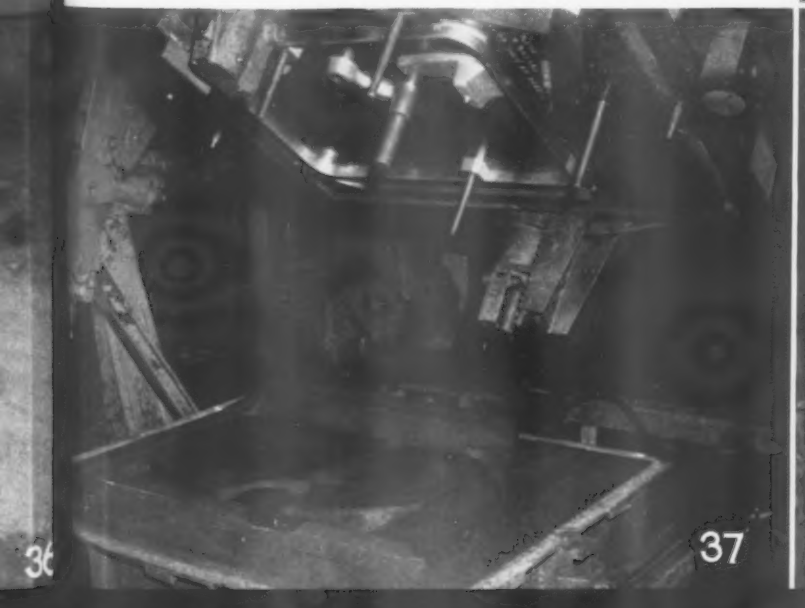
Fig. 34—A four-piece corebox which makes 24 identical cores in one blow

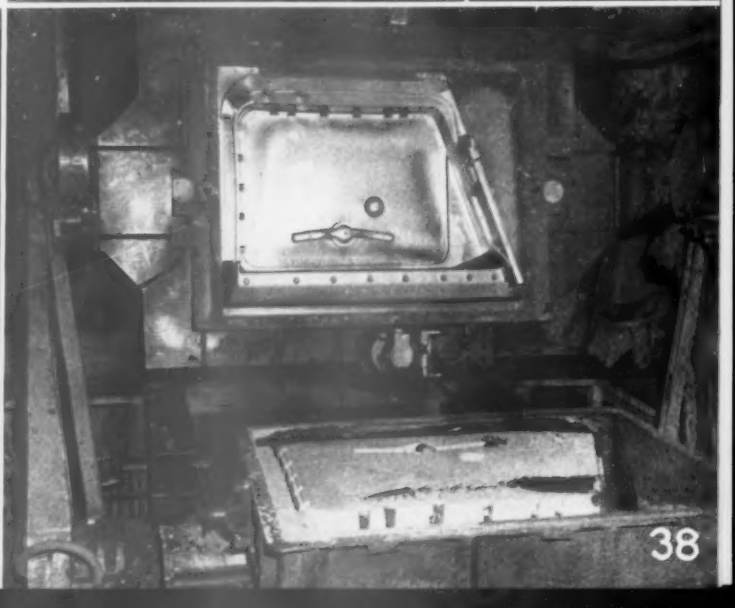
Fig. 35—Another method of making multiple cores for high production rates. This power-jolt machine completes 36 identical cores in one operation

Fig. 36—High production of larger cores on machine similar to that shown in Fig. 35. Forty cores of this type can be produced per hour

Fig. 37—Cope half of a job requiring a 9 x 42 x 54 in. flask section each for cope and drag

Fig. 38—Drag half of the job shown in Fig. 37





Pours Engine Castings in DRY SAND MOLDS

In this first of two articles dealing with foundry facilities and practices of the Chicago Pneumatic Tool Co. at Franklin, Pa., general features of the foundry are covered. A second article, to be presented next month, takes up molding features

By PAT DWYER
Engineering Editor
THE FOUNDRY

SOMETHING over half a century ago, 1894 to be exact, the Chicago Pneumatic Tool Co. was organized by a group of Chicago and New York business men with head office in Chicago. The company purchased the plant of the Boyer Machine Co., Detroit, maker of pneumatic hammers for a number of years. This was the beginning of a program of expansion that embraced the acquisition of many plants, the building of new and extension of existing plants, and entrance into many related and unrelated sections of the industrial field. By 1910 the company's products included air economizers, little giant bell ringers, holders on, magnetic old men, railway motor section cars, and cement guns. Today's line starts with A for air compressors and runs all the way through the alphabet to Y for yoke riveters, or a total of several hundred different tools and mechanical devices in thousands of sizes and combinations.

In 1928 the company purchased the Franklin Foundry and Franklin Mfg. Co. plants at Franklin, Pa.; these were dismantled and the present foundry was erected and equipped in the most modern manner.

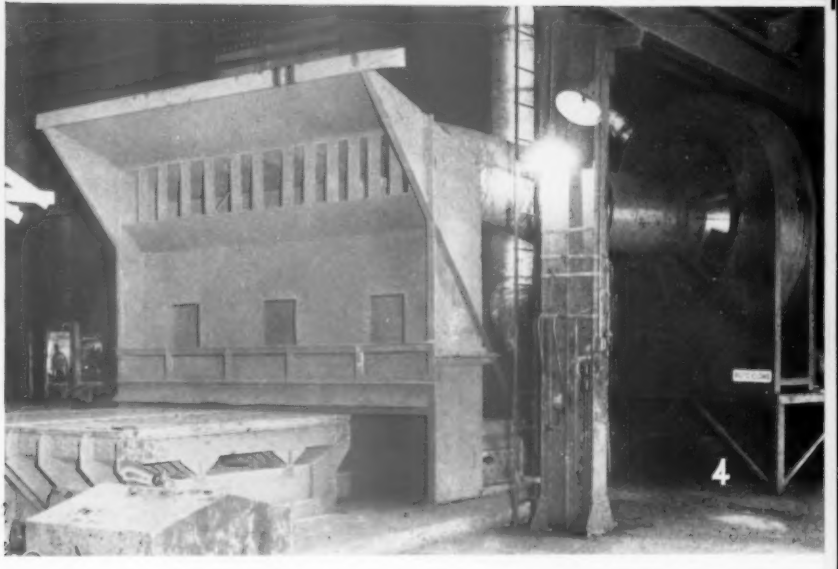
Foundry Is Well Lighted and Ventilated

The present foundry building, 130 x 480 ft with steel frame and brick walls, is amply lighted and ventilated through large continuous windows in the walls and in the vertical sides of a monitor type roof. The original foundry building, which extended across the east end of the main building and connected through a large opening in the partition wall, now serves as a cleaning room. A roofed stock yard, 47 ft wide extending 335 ft on the north side of the main building, houses all the raw materials, including pig iron, gray iron and steel scrap, coke, limestone, and molding and core sand. A mezzanine floor or gallery serves as a storeroom for facing, binder material and all the miscellaneous tools, supplies, spare parts and other items required in the maintenance and operation of the foundry.

The east end of the stock yard division is equipped with the necessary power tools and appliances for alteration and repair of patterns. The main pattern shop is located on part of the second floor in the adjoining machine shop building. The central portion of the mezzanine floor extends into the north side bay of the foundry and serves as a charging platform for the cupolas.

Following the usual or conventional style of building, particularly foundries engaged in the production of medium weight and heavy gray iron castings, the foundry at Franklin is laid out in three parallel and longitudinal bays extending the full length of the building and separated by the steel columns which support the roof and the crane runways. The center bay is 60 ft wide and each of the side bays is 35 ft.

Extent to which dry sand cores enter into the construction of molds is illustrated by the fact that the entire south bay is devoted to their manufacture, baking and assembling. Details of this department will be taken up later. The greater part of the center or main bay is taken up by the molds in process of construction, later assembly and



then set up either singly or in long, straight rows for convenience in pouring. At the shakeout station near the east end of the main bay all the molds pass in routine every night. The castings are removed to the adjoining cleaning room. Gates and scrap are collected and trucked to the cupola charging platform. Flasks are stacked in the vicinity of the various molding machines. The sand is retrieved and processed and sent on the way to the various molding stations.

Two cupolas with auxiliary equipment, daubing material, etc., occupy space about the center of the third or

Fig. 1—Men who pour the iron are equipped with leggings and safety shoes

Fig. 2—Sets of cores are placed on the floor and on benches in readiness to be placed in the molds

Fig. 3—Instead of regulation type copes, many molds are covered by dry sand cores clamped and wedged in place

Fig. 4—A powerful suction fan removes dust and smoke from the shakeout

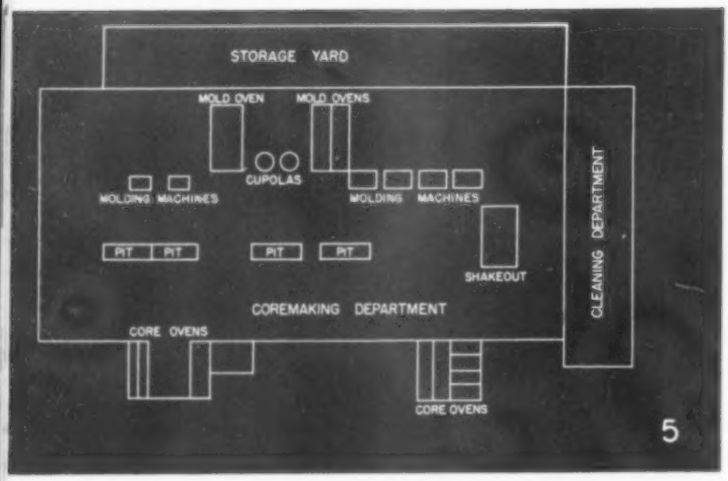


Fig. 5–General foundry layout

north bay. A considerable variety of small castings is made in that section of the north bay between the cupola room and the east end of the building. Molten metal from the cupola is conveyed into this department in a 1000-lb ladle suspended from a monorail. Space in the north bay between the cupola room and the west end of the building is a combined storage and repair department, also a place for checking incoming live patterns and outgoing patterns that have served their purpose and are on the way to storage or to the pattern shop for repair or alteration. Alterations, changes and improvements are going on constantly in this and, for that matter, every plant engaged in the production of gas, oil, or diesel engines and related forms of mechanical equipment.

Majority of the patterns are wood. Design of power units has been and still is in a constant state of development and improvement, and with the exception of a limited number of more or less standard auxiliary parts, orders for castings never equal the almost astronomical proportions which characterize the automotive and a few other industries. For these reasons, and with the exceptions noted, it is neither necessary nor economical to construct metal patterns. Testimony to the volume of work handled and the miscellaneous character of the castings is shown in a large building on another part of the plant site, packed from floor to roof with wood patterns of all shapes and sizes for castings ranging in weight from fraction of a pound to 11 tons for the base casting of a 1650-hp diesel engine, the largest size at present under construction in the shops of the company.

Floor of the central or main bay of the foundry is sand, but there are no large, and unsightly heaps scattered around. Flasks are filled with sand from overhead hoppers and rammed on a battery of molding machines of varying capacities set up close to the columns which separate the main bay from the north bay. Engine base castings, frames, flywheels and other exceptionally large castings are molded in four concrete wall pits in the floor. Two pits, 12 x 25 ft, are 7 ft deep. A third is 10 x 20 ft and 45 in. deep. A fourth pit, 12 x 20 ft, is 75 in. deep.

All pits are equipped with binders across the bottom, with eye bolts up to the floor level and with vent pipes extending down to the coke bed. When not in use for any considerable period, the pits are filled with sand up to the level of the surrounding floor and thus provide additional floor space for setting up, coring, assembling and pouring other molds made on the machines.

Floors on the side bays are surfaced smoothly with concrete with the exception of an area in the vicinity of the cupolas, and another area 100 ft long at the west end of the south bay where large cores are assembled, fitted and calipered to exact measurement before they are placed in the molds. Small and medium size cores are assembled and made ready on a cement surfaced section of the same bay at the east end.

The coreroom, which occupies the entire south bay and extends the full length of the foundry, is well equipped. The east end has four rack type gas-fired ovens 7 x 7 ft and 7 ft 6 in. high, each holding two racks. These ovens are equipped to be fired either with oil or gas. Two car type ovens in the same group are used for drying cores too large to be lifted by hand. Cores and plates are lifted by the crane and stacked four-high on long railroad rails resting on upright members attached to the car frame. Each oven is 12 x 23 ft, 8 ft high.

Instead of pulling the car into and out of the oven in the usual manner—with a cable or chain on the front and with the far end reeved through a sheave in the back wall

of the oven, and the cable from the front end reeved through a sheave anchored to a dead man in the floor and then looped over the crane hook—the cars under consideration are pushed into the oven and pulled out later by one of the lift trucks operating on the floor.

A gagger and rod machine and a wire straightener furnish a complete rod and wire department. Entire coreroom floor is swept clean each night and the accumulated spilled sand is run through the sand washing and reclaiming unit where it is mixed with sand from the castings and then routed through the sand distributing system. Core sand and dry sand facing are prepared in two muller type machines. An additional muller and one paddle type mixer are held in reserve for use in emergency. The paddle type mixer also is employed in preparing small special batches of sand.

Benches, machines and floor coremaking stations are serviced by four electrically-operated lift trucks and several hand trucks of 3500 lb capacity. Sand in certain large and small coreboxes containing intricate ribs, flanges, bosses or other projecting members, is rammed by hand. All other cores are rammed on hand or power operated jolt rollover machines. The most recent addition to the mechanical equipment is a unit including a jolt rollover machine, 1000 lb capacity, and a roller conveyor on which the cores are delivered. From the conveyor the cores are lifted by the crane and loaded on the core oven car.

All the dry sand facing is made from synthetic sand bonded with a pitch base compound and a little bentonite. Small, thin and intricate cores are made from an oil sand mixture in which the proportion of oil to new silica sand is 1 to 65. In some instances where high green strength is an important factor, a small (*Please turn to page* 112)

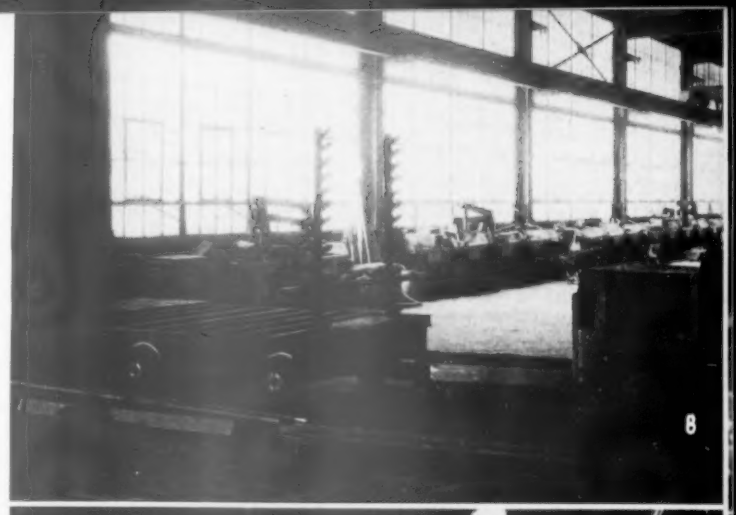


Fig. 6—Sand for a rollover molding unit is supplied by overhead hoppers

Fig. 7—A special type gate on the bottom of each hopper fills the flasks with sand

Fig. 8—A lift truck moves the car into and out of the core oven

Fig. 9—In this installation molds pass from the machine onto a roller conveyor

Cupola R

Recommendations for maintenance of various sections of the cupola are included in this second and concluding article on cupola refractory practice. The first installment was presented in the April issue

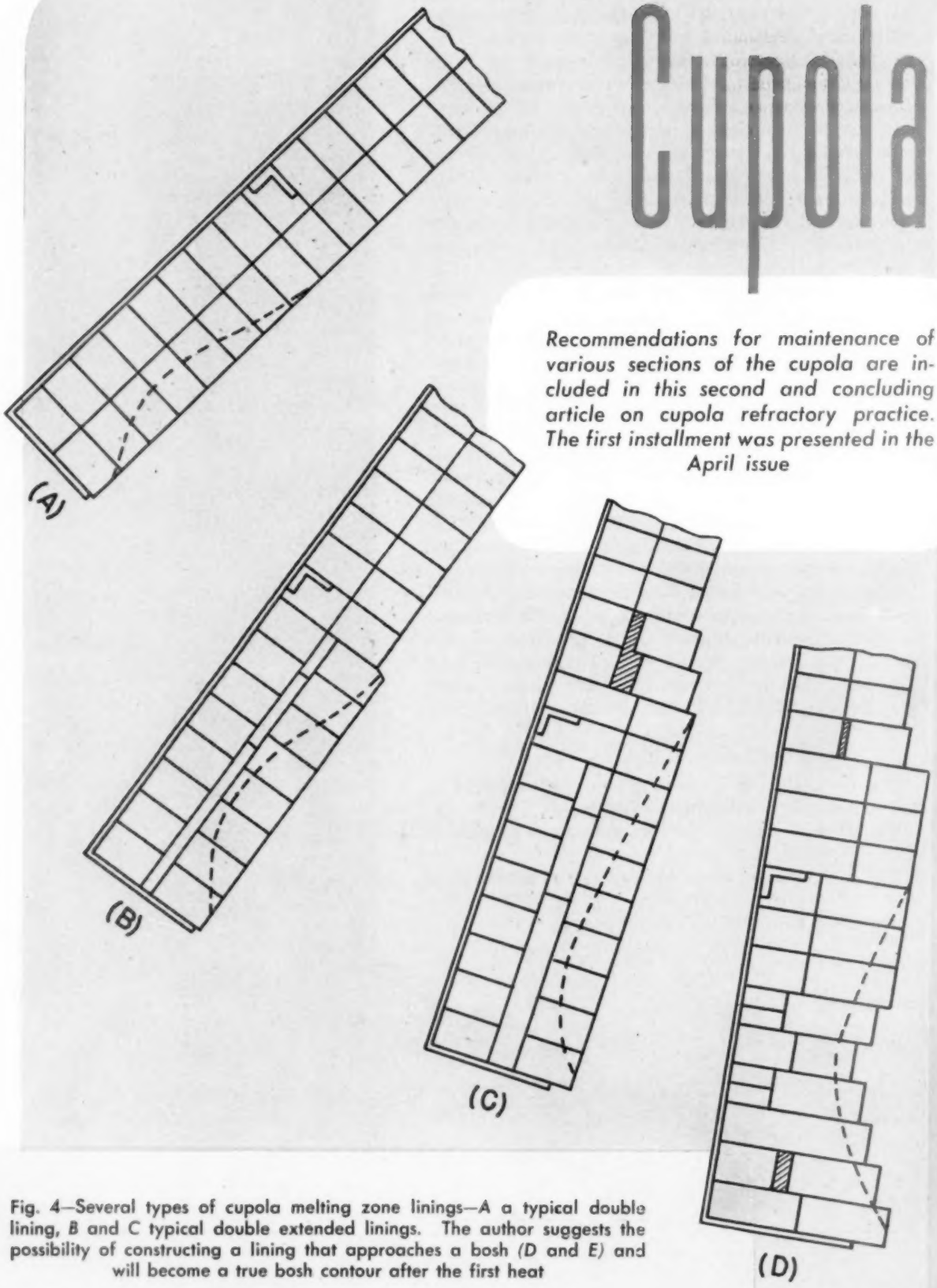


Fig. 4—Several types of cupola melting zone linings—*A* a typical double lining, *B* and *C* typical double extended linings. The author suggests the possibility of constructing a lining that approaches a bosh *(D* and *E)* and will become a true bosh contour after the first heat

Refractories

By RAY A. WITSCHEY
A. P. Green Fire Brick Co.
Chicago

THE one most important phase of cupola refractory practice is melting zone maintenance. This is an every-day job and the foundry's refractory costs will in a large measure be a function of the planning and care devoted to setting up standard procedures and practice for this job.

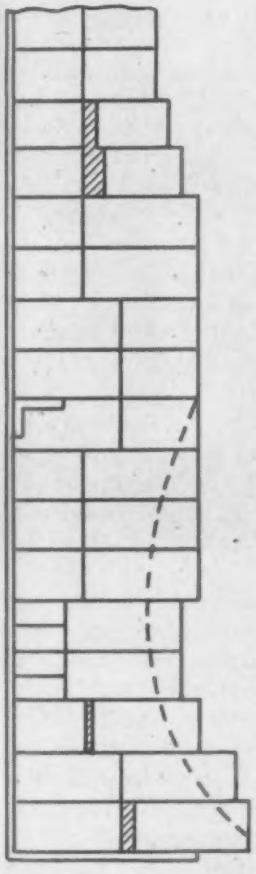
If replacement of the entire service lining (4½, 6, or even 9 in. as the case may be) is involved, then the considerations outlined previously for a new installation apply, whether it be with fire clay shapes, natural stone, or monolithic construction. The big problem in this case is the arranging of the schedule for getting the job done and the very important problem of providing for supervision.

If smaller heats are taken and the burn-out does not require complete replacement, then the maintenance procedure consists of replacing the eroded or burned-out sections with some type of refractory and bringing the lining back to the original (or desired) contour. Three general methods are employed:

1. Replacement with fire clay brick shapes.
2. Replacement with natural silica stone.
3. Replacement with monolithic refractory of plastic refractory.

Irrespective of method used, the careful and complete removal of slag and coke from above the tuyeres and from the complete area to be repaired is essential. Unless this is done carefully, any patch is likely to slip or wash out.

It is desirable to remove the first two courses above the tuyeres if the burn-out justifies it and replace with new blocks. This practice provides for a good foundation on which to make the repair. If the burn-out is less severe, it is desirable to cut back an adequate ledge in this area to give a good foundation to support the repair.



(E)

Should Be Anchored Securely in Place

If the repair is to be made with standard fire clay refractory shapes, the nature of the repair will depend upon the extent of the burn out. The preferred practice is to use that combination of shapes which will give the most stable construction and may indicate the use of standard 9-in. circle brick and sometimes arch brick as well as straights and splits. These are installed with daubing mud or plastic refractory using the proper amount to hold the fire clay shapes in place and to fill up all openings that cannot be filled with the fire clay shapes. Every advantage of extra anchoring and support should be taken, and this is made easier if the proper ledge or base has been provided above the tuyeres.

Perhaps the most important consideration is the preparation of the daubing mud, and every operator will agree that nothing done in the foundry finds a wider selection of materials and methods than does the preparation of daubing mixes. The materials employed are silica ganister, sand, refractory grog, fire clays, and just clays or loams. The choice of materials too often is dictated by what happens to be at hand. About all that can be definitely stated is that they are some form of alumina-silica mixture and as such their behavior might be anticipated by a study of the silica-alumina phase equilibria relationships. Unfortunately, this is only one factor in trying to ascertain what any such mixture will do in service. The other factors of grain sizing, method of mixing, method of tempering, type of service to which subjected, are also of such importance that it is difficult to use daubing mixes on the basis of thermo-mineralogical considerations which in the first place are based on equilibrium conditions not always, if ever, obtained in the use of these materials. Much has been written on ganister clay mixes of widely varying compositions and types by Blackburn[2] and Dress[3].

Perhaps the most widely used mixtures are made up (*Please turn to page* 232)

Questions and Answers

Producing Pot Metal Castings

Q.—Where can we obtain information regarding procedures and methods of casting pot metal? We also would like information regarding the manufacture of molds and dies suitable for this work.

A.—The term pot metal is one applied indiscriminately to a number of compositions. For example, it is used to designate a plain gray iron suitable for the making of pots and pans; to indicate a copper-base alloy containing about 80 per cent copper and 20 per cent lead for ornamental castings, etc., and to a lead alloy for ornamental work, novelties, etc. Presumably, the mention of molds and dies indicates one of the nonferrous alloys. While bronze molds are used for producing ornamental type castings of the lower melting point alloys, we do not believe that they will serve as well for the 80 Cu-20 Pb alloy which must be poured at a considerably higher temperature, and iron or steel molds may have to be employed.

Bronze molds usually are made in plaster composition from the master pattern or a plaster replica of it. Plaster composition as a molding medium provides a mold with an extremely smooth face as well as one with close dimensional tolerances. Plaster composition for the molds is a type designed for castings' production and may be secured from a number of sources. Iron molds are made of a suitable composition which will resist heat, while steel dies fall into the class known as "die steels." Necessary cavity or impression for formation of the casting is tooled out of the solid.

Type of Gate Is Not a Factor

Q.—We are having surface pinhole trouble with a small gray iron ring casting 11 in. outside diameter, 6¾ in. inside diameter and 15/16-in. thick. The customer has set a machining allowance of only 0.007-in. on both surfaces. The casting is molded in a snap flask and gated through two inlets ¼ x ¾ in. connected to a single sprue in one corner of the cope. We melt high grade pig iron in an oil-fired furnace and have had no trouble with other castings. We have been using grade 00 sand with satisfactory results in our foundry for the past 11 years. If necessary will you kindly suggest another type of gate.

A.—In this particular instance the gate is not an important factor. Any size, shape or position of gate that would allow the metal to enter the mold would serve satisfactorily. In fact, the molds with suitable bands could be stacked 10 or 12 high and poured through single gates attached to a central sprue. However, with that method the sand would have to be more highly permeable than the present grade. The pinholes in the ring castings are caused by one, or possibly a combination of two factors. The first is low permeability sand. The second is a tight bottom board. You have two alternative solutions for the problem. One is to use a more permeable sand. The other is to slightly change the molding technique.

The first method is preferable where a large volume of castings is required. If a more permeable grade of sand is not available, a fairly satisfactory grade may be evolved by making up a 50-50 mixture of sharp sand and your present sand. In the second method it will be necessary to scratch or otherwise form numerous vent channels between the bottom board and the sand face with which it comes into contact. This is easily done if the board is applied by hand. If it is squeezed into place on a machine, it can be removed temporarily while the vent passages are formed, and then replaced. The object in both cases of course is to provide an easy and rapid passage for the steam generated when the mold is filled with iron. Incidentally, the volume of steam can be held to a minimum by working the sand as dry as possible. For an object lesson and for your own satisfaction, leave the cope off one of your present molds, fill the mold with molten iron and watch the reaction of metal and steam.

Permanent Molding for Bronze

Q.—We are interested in obtaining information on the permanent mold casting of bronze or any equivalent method.

A.—Not a great deal of information has been published on the use of permanent molds in making bronze castings, but in general the same principles employed in making molds for aluminum will apply. Hence your attention is directed to the following articles which have appeared in THE FOUNDRY: "Permanent Mold Castings," by John Vickers, February and March, 1945; "Vacuum Permanent Mold Casting," by Jack W. Wheeler, June, 1946, and "Permanent Molds for Casting Aluminum," by Vincent J. Sedlon, August, 1946.

As Mr. Sedlon points out in his article, the mold consists of two or more parts mounted on a base plate. Mold parts are made to open and close and are kept in alignment by hinges, tracks, or guide rails. Mold may be operated by lever, rack pinion or air cylinder. Factors to be considered in engineering a mold are distribution, radiation and retention of heat developed from continuous pouring into the mold. The mold maker positions the cavity to its best advantage in the mold, taking into consideration the down sprue, gates, risers and reaction of the metal in the process of solidification.

Other factors in planning a mold are determination of the best parting, providing supports for sand cores if necessary, allowing for shrinkage of metal and including a draft angle to permit removal of the casting. Mold thickness ranges from ¾-in. up with a rule-of-thumb method that the mold should be about four times the casting section thickness. Substantial ribs and flanges to stiffen the mold are cast on the back, and clamping lugs and clamps are provided to lock the mold sections together.

Design of gating and risering system follows the basic principles of directional solidification as in any other method of casting, meaning that it must be such that freezing

begins at those points farthest from the gate; gradually progressing to the gate which freezes last. By such procedure the liquid metal in the gate continues to compensate for shrinkage involved in solidification.

Wants To Reduce Baking Time

Q.—Our regular core sand mix is composed of 3 lake sand, 1 silica sand and 3 qt core oil. We bake our cores at 375 to 450 F depending on size of the core as to length of time, usually ranging from 1½ to 1¾ hr. Our cores are good, but we would like to know how we can shorten the baking time with this kind of a mix, and still have good cores.

A.—So far as we know the only way you can determine whether you can decrease the baking time of your cores is to take one or two out at various times during that period and allow them to cool. Then break them open to examine the center of the heaviest section and see whether they are baked through. In baking cores, the first step is driving off the water, and no matter how much heat is applied the temperature of the core will not exceed 212 F, the boiling point of water. When the water is driven off oxygen (supplied by the air) proceeds to polymerize the oil binder which develops its adhesive power. Consequently, the lowest possible amounts of water and oil should be used to obtain the shortest baking time.

Water, of course, is necessary to provide a workable sand, but it is possible that you could reduce the amount to some extent. Similarly, the amount of oil might be reduced. Since you omitted to state the unit of measure for the sand, we guess that it is cu ft which would be an oil to sand ratio of about 1 to 40. We believe that you can decrease the oil-sand ratio to 1 to 50 and probably 1 to 60 without affecting the utility of the cores. You may be able to shorten the time by better control of the oven temperature so that it is near the high side at all times. We believe that you will obtain more uniform results in any case by closer control of oven temperature, as a swing of 75 F is quite large.

Seepage in Gear Pump Casting

Q.—We have been experiencing considerable trouble with a small gear pump casting weighing approximately 20 lb. Castings must operate under oil pressures up to maximum of 1500 psi, and we find a tendency for spot seepage of oil at pressures below that. Mixture is made of 40 per cent pig and 60 per cent gray iron scrap with 2 per cent nickel and 0.6 per cent chromium. Resulting castings have excellent machining qualities and clean surfaces. We have tried 15 per cent steel scrap additions without satisfaction. We believe that solution of the trouble is closer grain iron, and would like information on how to accomplish that.

A.—While it is true that seepage trouble such as you are encountering often is due to the grain structure not being as close as desired, we suggest that you look into the possibility of the gating and feeding system being the culprit. Slight lack of feed will leave minute passages between the grains, and to the naked eye the fracture may appear to be coarser than where full feeding has been attained. Since we do not know what the casting looks like or how it is gated, we cannot offer any definite suggestions. Possibly you may have to use chills or denseners to promote more rapid freezing at some points, or change the section thickness so that a gradual rather than abrupt change is made from one thickness to another.

As you mention, the trouble may be due the grain size being too coarse. Perhaps the silicon content is too high and should be reduced by use of lower silicon pig iron or by dilution with steel scrap. You mention that 15 per cent addition did not give satisfaction, and it may be that more should be used—say 25 or even 40 per cent. Again it may be possible that better results can be obtained by adding part of the silicon in the ladle instead of placing it all in the charge. You do not mention the silicon content of your iron, but you might try reducing it 0.50 to 1.0 per cent in the charge, and adding it in the ladle. In any event do not make more than one change at a time so that you can follow through on a sound basis, and actually know how the trouble was eliminated.

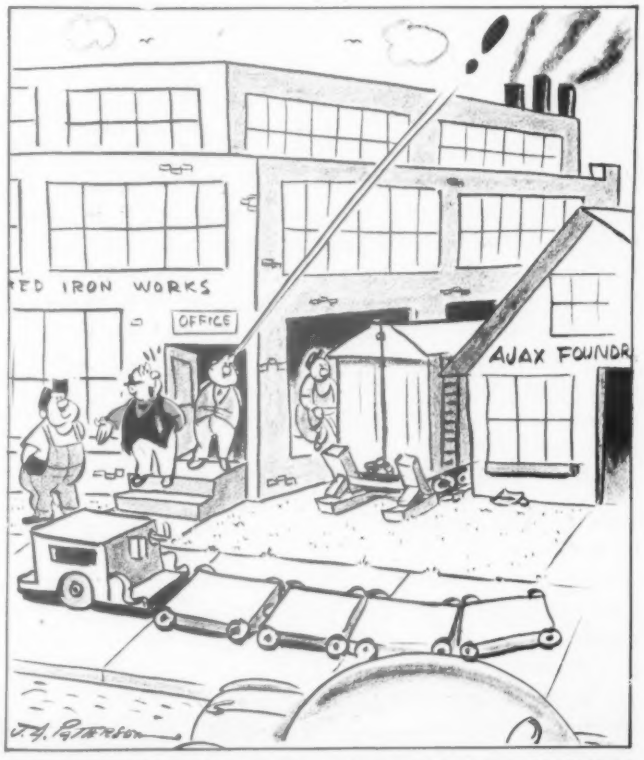
Gives List of Large Castings

Q.—Since you probably have the information in your files, we shall appreciate a list of the largest and heaviest castings ever produced in the foundry. By this is meant the net weight of the casting, cleaned and ready for machining.

A.—So far as our records show, the largest and heaviest gray iron casting is a 600-ton anvil base, cast in the Russian city of Odessa on the Black Sea, in 1866. It never was machined or moved from the pit in which it was cast. The Great Bell of Moscow, 220 tons, was cast in 1733 and remained in the pit until 1736 when it was lifted and set up on a pedestal in what now is the Red Square. During the fire which stopped Napoleon's triumphal march in 1812, the bell was cracked and a large piece fell out.

A cast iron figure of a lion in China stands 20 ft high and is 16 ft in length. The metal thickness varies from

GANGWAY! By J. A. PATTERSON



"It's our neighbor, Ajax Foundry—they want to borrow 50,000 lb of pig iron until Saturday."

⅛ to 8 in. No estimate of the weight is available. A stickler for accuracy might claim that this casting is not a legitimate entry in a large casting record. The mold and core were built up a small section at a time and metal was poured into each section in turn until the entire figure was completed. A huge bronze figure of Buddha, estimated weight 200 tons, cast in Kamakura, Japan, 1252 A.D., stands 50 ft high and was cast in five sections.

Coming down to modern times, on Jan. 4, 1931, the Bethlehem Steel Co., in the Bethlehem, Pa., plant poured a steel platen casting for a forging press, net weight 230 tons. More recently, early in 1944 the same company turned out a cast iron ingot mold, weighing 200 tons. Within the past year the United Engineering & Foundry Co., in its New Castle, Pa., plant, produced a 236-ton steel casting frame for a forging press. The foregoing list does not include a complete list of large and heavy castings, ferrous and nonferrous, but it probably will serve your present purpose.

Melting Iron in the Crucible

Q.—We should like to melt some gray iron to pour into chills, snap mold weights, etc. Is it considered practical to melt gray iron in a crucible, and if so is it necessary to use a flux, or to cover the charge with charcoal or glass?

A.—According to a prominent crucible manufacturer, melting gray iron in a crucible is so simple that it is surprising the practice is not more general. The iron is broken to approximately walnut size and packed in the pot with alternate layers of charcoal. For example, a No. 60 pot could be charged with three 3-in. layers of iron and three 1-in. layers of charcoal. This would yield about 50 lb of molten iron. This amount might be increased by adding more iron and charcoal as the charge sinks in the pot. It is advisable to keep the pot covered with the bottom of a discarded crucible.

Gray iron melts at a temperature of approximately 2300 F, considerably higher than that of brass, but with the layers of charcoal in the center the iron will melt readily and rapidly. This assumes, of course, that the furnace is in good working order. High temperature cannot be achieved in a furnace where the grate is clogged, or where there is not a good draft in the flue and chimney. If the castings are to be soft and machinable it may be necessary to add a small amount of ferrosilicon or ferromanganese, or both, to the all scrap charge. As an alternative measure it might be interesting to throw iron and charcoal into the crucible in a general mixture instead of in layers. This was the method employed by early cupola melters. Results were quite satisfactory where the work was done by an experienced operator.

Use Cupola in Melting Bronze

Q.—We shall appreciate any information on the subject of melting brass and bronze in the cupola.

A.—Cupola melting of copper-base alloys has been practiced over a long period. Recently a special small type cupola 24-in. diam has been developed specifically for this purpose. Coal tar pitch coke is used as fuel because the sulphur content is extremely low. Petroleum coke, by-product coke, charcoal, and mixtures of by-product coke and charcoal have been used successfully for melting the red metals in the cupola. The method is not suitable for melting brass. Loss of zinc through oxidation is too high. For melting bronze the blast pressure is kept in the vicinity of 3 oz, and the volume estimated at 150 cu ft per lb of coke. Assuming that only ordinary by-product coke is available, it is suggested that coke in the bed be about 27-in. above the tuyeres when burned through and settled down.

In a 24-in. diam cupola the maximum charge should not exceed 600 lb. However, it may be advisable to start with smaller charges, say 300 lb with 25-lb coke splits, and gradually increase the weight as experience may warrant. About 1 lb fused soda ash will reduce the sulphur and thin the slag so that it will run more readily. Melting capacity of a 24-in. diam cupola is approximately 4000 lb per hr. Opinions vary on the metal loss in cupola melting. Claims as high as 98.5 per cent recovery have been made with an all ingot charge. The loss is principally zinc. Analysis should be made of the final metal to determine the exact loss of each component in the alloy. Proper corrections may be made in the ladle. Deoxidation practice is the same with metal melted in any type of furnace and usually means the addition of about 1 oz of phosphor copper per 100 lb of metal in the crucible or ladle.

Controlling Brinell Hardness

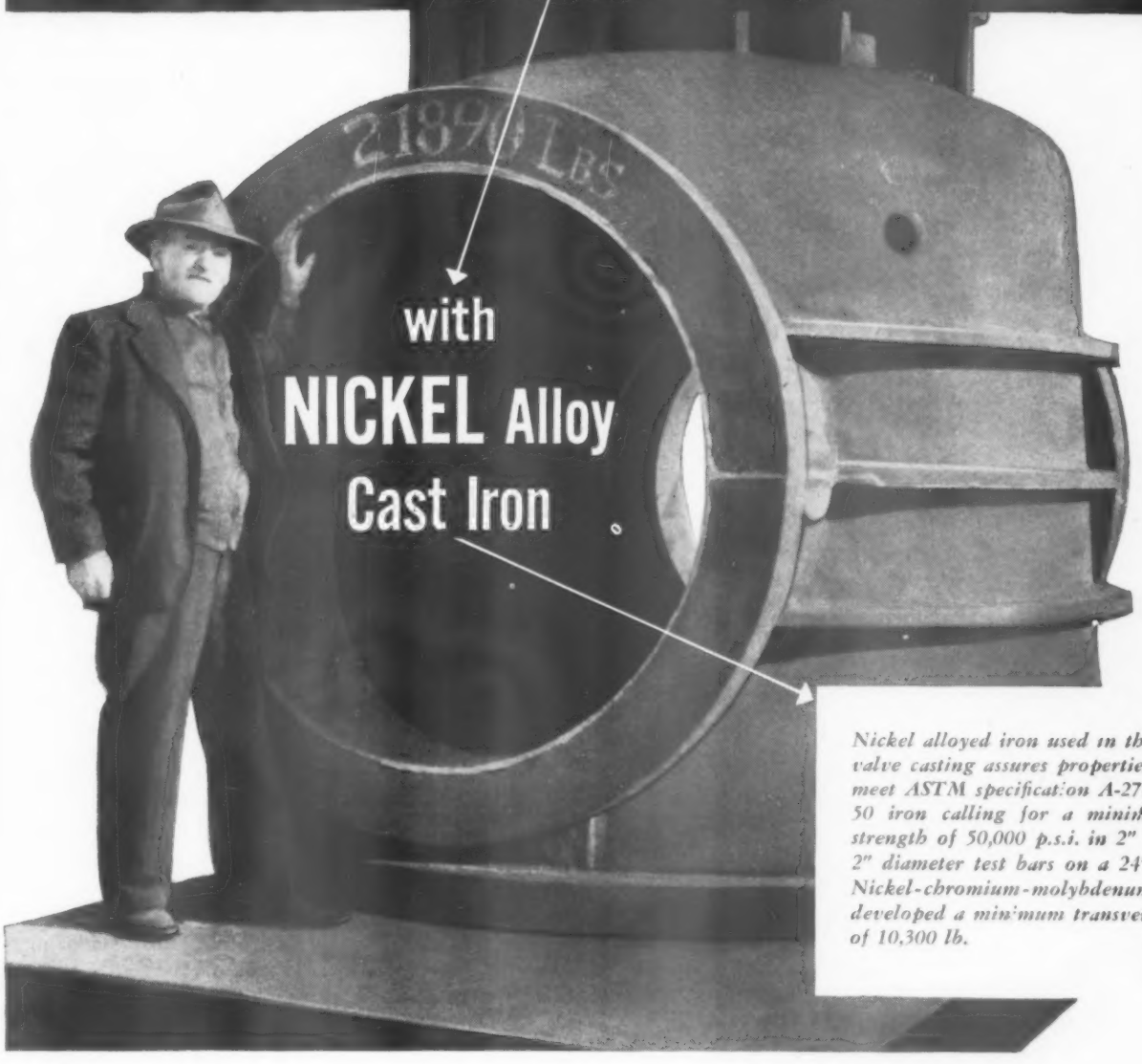
Q.—We are making some large axle carriers of gray iron which are about 17 in. long, 11 in. diameter with a 7⅛-in. bore. Castings show about 2.46 to 2.55 per cent Si, 3.22 to 3.36 per cent TC, and 0.56 to 0.63 per cent Mn. Trouble is with obtaining a brinell hardness number on the flange between 197 and 207; on seven different castings it was found to range from 105 to 207. Specification also calls for a minimum transverse load of 3400 lb on a 1.2-in. bar, 12-in. span.

A.—Without being on the spot to follow through on the various steps employed in producing the castings you mention, it is only possible to offer suggestions on how you might obtain more uniformity in brinell hardness. Cooling conditions exert considerable influence, and it is quite possible that the wide range from 105 to 207 may be due to the length of time the casting remains in the mold. A casting shaken out as quickly as possible after solidification will cool more rapidly than one left in the mold for several hours, and will show a higher brinell hardness.

Several methods are available from which to make a choice which will fit in with your present procedures. One is the reduction of silicon content, say by 0.15 to 0.20 per cent, and see if that will give your objective. If you believe that the silicon content should not be any lower than its present point, you might try leaving out about 0.50 per cent silicon in the iron charge and later adding that amount in the ladle. Total silicon will be the same, but the structure will be different.

Leaving the silicon content at your present range you might try the addition of a small amount of chromium in the range of 0.25 to 0.50 per cent and observe the results obtained. Instead of chromium you could try one of the several carbide stabilizing inoculants which are available. Producers of these and of the ferroalloys will be glad to give you the benefit of their experiences in solving your problem.

Kutztown Meets Specifications for Delaware Aqueduct Job



Nickel alloyed iron used in this 54" rotovalve casting assures properties needed to meet ASTM specification A-278-44T Class 50 iron calling for a minimum tensile strength of 50,000 p.s.i. in 2" sections. In 2" diameter test bars on a 24" span, this Nickel-chromium-molybdenum cast iron developed a minimum transverse strength of 10,300 lb.

Rotovalve bodies and plugs and related castings meeting every specification of New York City's Board of Water Supply, were produced by the Kutztown Foundry and Machine Corporation, Kutztown, Pa., in high test Nickel alloyed cast iron.

This is but one of thousands of examples that show how Nickel cast iron renders these basic advantages:—

IN THE FOUNDRY—Nickel aids the progressive foundry to meet high mechanical property specifications. It is employed in the production of engineering cast irons because it strengthens the pearlitic matrix of the iron, produces finer and more highly dispersed graphite and discourages the formation or retention of hard carbide particles.

IN THE MACHINE SHOP — Nickel cast irons provide readily machinable castings that take a smooth finish because of their improved structure and uniformity, particularly where changes in cross-section introduce difficulties and losses with unalloyed irons.

IN SERVICE LIFE—Nickel cast irons are strong, pressure-tight and resistant to graphitic corrosion, a frequent source of trouble in valves, pipes and fittings.

EMBLEM OF INCO SERVICE
TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the selection, fabrication, treatment and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes and other alloys containing Nickel. This information and data are yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 WALL STREET
NEW YORK 5, N. Y.

JAMES H. LANSING

JOHN H. SIBBISON JR.

HOMER S. COZAD

Quality Control Service

Performed by Malleable Founders' Society

A UNIQUE quality control service is performed by the Malleable Founders' Society for its member companies. It is based on the long experience of the malleable industry organization in co-operative work for the improvement and maintenance of quality standards for malleable iron castings.

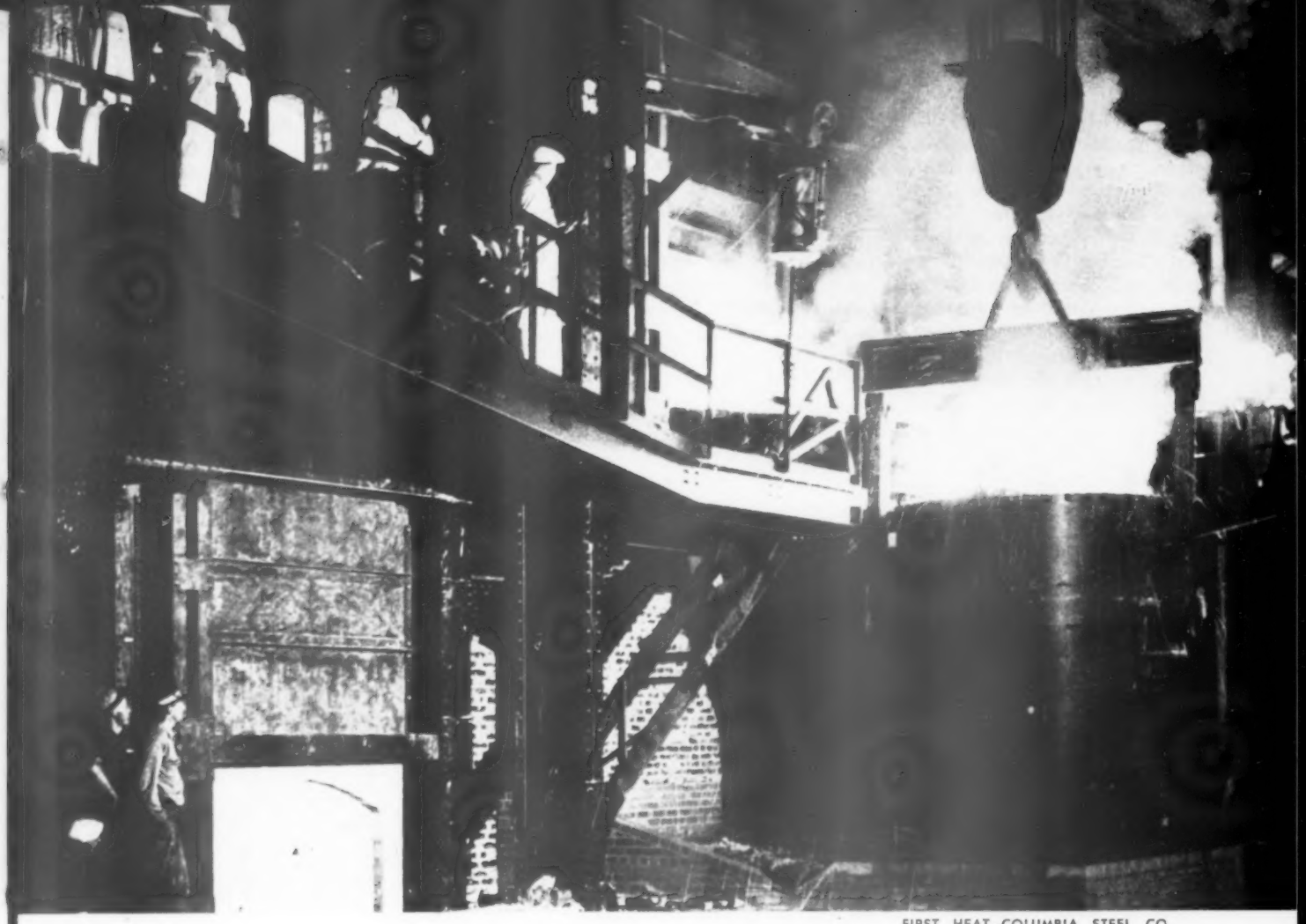
The cornerstone of the present service was laid in 1913 when the malleable producers obtained the services of the late Enrique Touceda and use of the facilities of his laboratory at Albany, N. Y. For nearly 30 years Professor Touceda directed the laboratory, shop practice and metallurgical service of the malleable industry organization as its consulting engineer.

In 1936, James H. Lansing, a graduate of Williams College, following 16 years of metallurgical, supervisory and managerial service in the malleable foundry field, became shop practice engineer of the Malleable Founders' Society and Professor Touceda's field assistant. In 1943, following the death of Profesor Touceda and the closing of his laboratory at Albany, Mr. Lansing was appointed consulting engineer by the Malleable Founders' Society.

On the recommendation of the new consulting engineer, a Malleable Founders' Society Laboratory was established in Cleveland. There the long established metallurgical control and consultive work of the malleable industry has been continued and expanded.

In 1942, John H. Sibbison Jr., joined the organization as assistant shop practice engineer. A graduate of Case School of Applied Science, Mr. Sibbison's previous metallurgical experience had been with the Inland Steel Co., Indiana Harbor. Shortly after Mr. Lansing's appointment as consulting engineer, Mr. Sibbison was promoted to shop practice engineer. (*Please turn to page* 208)

Laboratory of the Malleable Founders' Society is located in downtown Cleveland



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. . . . . experienced engineers who will furnish complete engineering services for the project. They will develop designs and specifications for both equipment and structures, and obtain suppliers' and contractors' proposals from which efficient purchasing can be made. They will provide supervision, for the owner, of the construction of buildings and the installation of equipment.

GIFFELS & VALLET, INC.

INDUSTRIAL ENGINEERING DIVISION
1000 MARQUETTE BUILDING, DETROIT

MEN of Industry

LESLIE C. THELLEMANN has been appointed executive vice president, Steel Founders' Society of America. Following graduation from the University of Buffalo, Mr. Thellemann practiced law for about 5 years and in 1937 joined the staff of the Buffalo Chamber of Commerce to inaugurate and direct a legislative and tax service program. In 1942 he became executive secretary of Inter-Allied Foundries of New York State where he gained detailed knowledge of various branches of the foundry industry. For the last year Mr. Thellemann has been treasurer and a director of Kencroft Malleable Co. Inc., Buffalo.

♦ ♦ ♦

Joseph W. Harvey has been appointed general sales manager, Vulcan Mold & Iron Co., Latrobe, Pa. Mr. Harvey joined the sales department in 1924. Under his direction expanded sales engineering services will be offered to mold users in ferrous and nonferrous fields.

♦ ♦ ♦

H. K. Clark, formerly executive vice president, Carborundum Co., Niagara Falls, N. Y., has been elected president. Mr. Clark attended Purdue University and Armour Institute of Technology. Following 2 years on construction work in South America and 3 years at Oliver Farm Equipment Co., South Bend, Ind., he became associated with the Norton Co., Worcester, Mass., where he started as a trainee and became vice president and general manager. In 1940 he joined the Advisory Committee for Defense and later the Office of Production Management. He was commissioned a lieutenant commander in the Navy, rose to the rank of captain and was assigned to the Army and Navy Munitions Board. Later he established the Emergency Plant Operation Division and operated 104 plants for the Navy. He joined Carborundum Co. last November as executive vice president in charge of operations. Mr. Clark succeeds **Arthur Batts,** president since 1942, who has been elected chairman of the board. **Edwin R. Broden** has been made vice president in charge of operations, member of the board of directors and a member of the executive committee of which President Clark becomes chairman. **William H. Wendel** has been appointed administrative assistant to the president.

♦ ♦ ♦

Stowell C. Wasson, manager of the Cicero and Melrose Park, Ill., plants of National Malleable & Steel Castings Co., Cleveland, has been elected a director of the company, filling the vacancy on the board caused by the death last year of Charles H. McCrea. Other officers and directors of the company have been re-elected. Mr. Wasson has spent his entire business career with National Malleable, beginning in the purchasing department of the Indianapolis works in 1911. He was transferred to the sales department there in 1920 and became sales manager the following year. In 1929 he became works manager and in 1943 was transferred to Chicago as manager of both plants. Mr. Wasson was elected a director of the American Foundrymen's Association at its convention last April.

♦ ♦ ♦

Col. C. C. Chambers has been re-elected president and general manager, Texas Foundries Inc., Lufkin, Tex. **R. S. Bradshaw Jr.** has been named first vice president and treasurer, **Jack L. Klein,** second vice president, **H. H. Brien,** third vice president and sales manager, and **A. C. Sinnett,** secretary. **W. C. Trout** has been re-elected chairman of the board of directors, which also includes **S. W. Henderson Jr., E. L. Kurth, B. B. Culver Jr., E. R. Culver Jr., Col. Chambers** and Mr. Bradshaw, who were elected at the annual stockholders' meeting. In connection with the 7th anniversary meeting, held Mar. 15 and 17, gold service pins were awarded to all employees who had been with the foundries for 5 years.

♦ ♦ ♦

James F. Bork has purchased the J. H. Bruns Foundry, Watertown, S. Dak., established over 40 years ago, which has been enlarged and modernized and which he will operate as the Watertown Foundry. Mr. Bork was associated with the Bucyrus-Erie Co., S. Milwaukee, Wis., at one time, as a metallurgical engineer. After leaving military service last year he became a consulting engineer on foundry operations for Lester B. Knight & Associates Inc., Chicago.

♦ ♦ ♦

Max Plehn has been elected president of the Quarter Century Club of Grede Foundries Inc., Milwaukee. Mr. Plehn is foreman of the Spring City Division at Waukesha, Wis. **Harry Strzyzewski,** of the Milwaukee Steel Division, has been made vice president, and **Michael Mayer,**

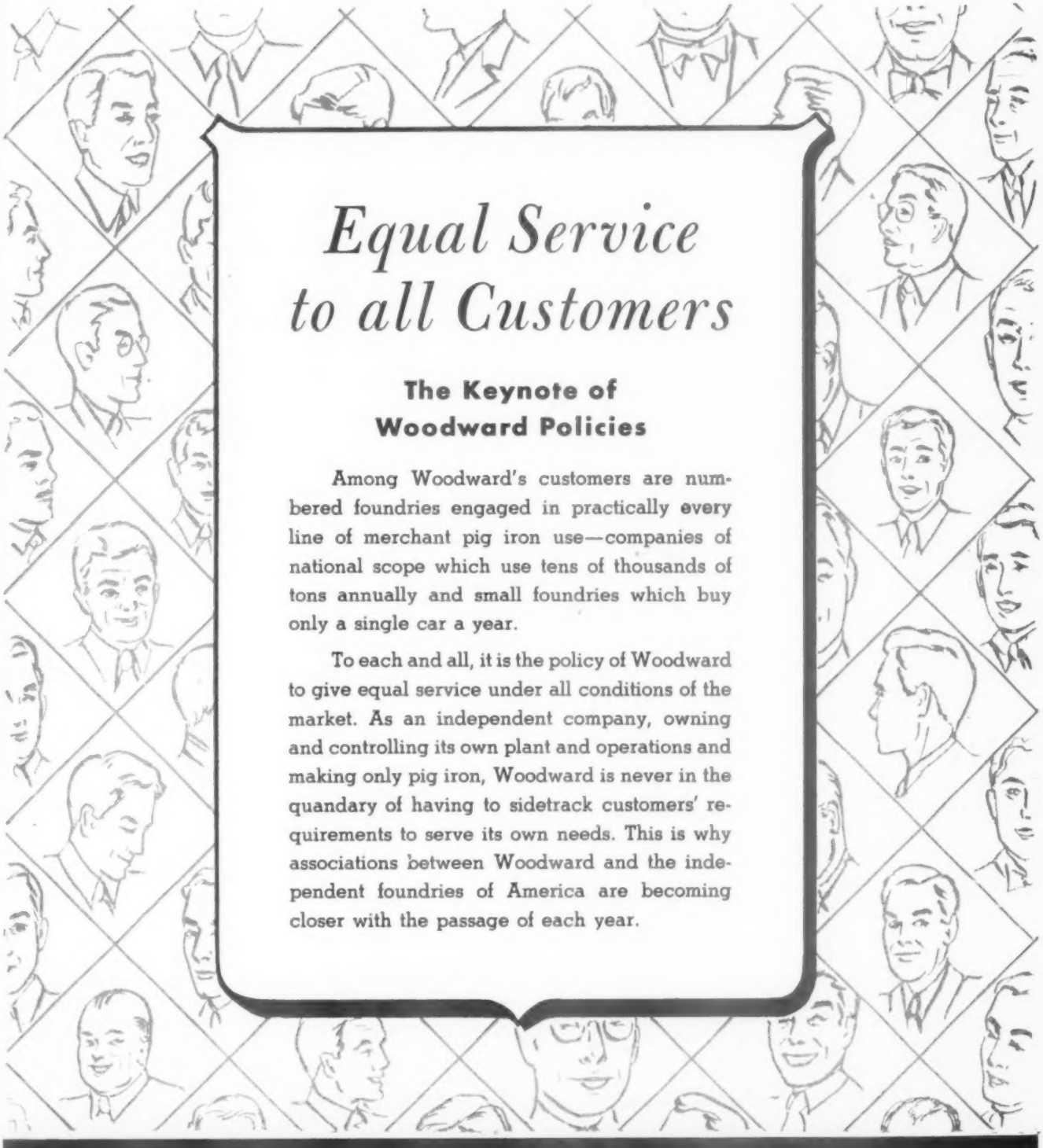
(*Continued on page* 104)

LESLIE C. THELLEMANN

JOSEPH W. HARVEY

H. K. CLARK

STOWELL C. WASSON



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Among Woodward's customers are numbered foundries engaged in practically every line of merchant pig iron use—companies of national scope which use tens of thousands of tons annually and small foundries which buy only a single car a year.

To each and all, it is the policy of Woodward to give equal service under all conditions of the market. As an independent company, owning and controlling its own plant and operations and making only pig iron, Woodward is never in the quandary of having to sidetrack customers' requirements to serve its own needs. This is why associations between Woodward and the independent foundries of America are becoming closer with the passage of each year.

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of the Liberty Division at Milwaukee, secretary-treasurer. **William J. Grede,** president of the company, and **Joseph Krenn,** senior members of the club, have been re-elected directors.

♦ ♦ ♦

H. B. Swan has joined Conover Engineering Co., Cleveland, as foundry consultant, with headquarters in the Detroit district office. Mr. Swan, a graduate of University of Michigan, retired last November as foundry superintendent, Cadillac Motor Car Division of General Motors Corp., Detroit, after 35 years of service. He joined that company in 1911 as a coremaker, and later became a molder's apprentice. He was appointed assistant superintendent of foundries in 1913 and superintendent about 1919. He built the new Cadillac foundries in 1924 and rebuilt them in 1945-1946. He joined the American Foundrymen's Association in 1913 and served as vice president in 1915 and 1916.

♦ ♦ ♦

David L. Parker, who recently was elected president of the New England Foundrymen's Association, since 1945 has been superintendent of foundries for the General Electric Co., Lynn, Mass. A native of Lynn, Mr. Parker first joined General Electric in 1922 as a chemical engineering co-operative student in the materials testing laboratory, and upon his graduation from Northeastern University in 1926 with a degree in chemical engineering he became permanently associated with the company as an analytical chemist in the works laboratory. Shortly after, at his request, he was transferred to the iron foundry where for 9 years he was subforeman of melting, research and tests and for a time was in charge of the machine molding and cleaning departments. From 1935 to 1939 Mr. Parker was general assistant to the superintendent of foundries and pattern shop, and the following year he was made superintendent of the Everett Works foundry. He has been superintendent of foundries since June, 1945. Mr. Parker has been active in committee work of the AFA steel division, is a past president of the River Works Foreman's Association, and was named to the executive committee of the New England Foundrymen's Association in 1943.

♦ ♦ ♦

Harold Myers has joined the Perfect Circle Corp., as a member of the central staff at Hagerstown, Ind., where he will be associated with **Will Cramer,** chief engineer of the manufacturing division. Mr. Myers, a graduate of Purdue University School of Chemical Engineering, is a member of the American Foundrymen's Association, a former chairman of the West Michigan Chapter of the American Society for Metals, and was secretary of the West Michigan section of the Society of Automotive Engineers, until his appointment with Perfect Circle Corp.

♦ ♦ ♦

M. F. Surls has been appointed metallurgist, Charles C. Kawin Co., Chicago. Mr. Surls has been metallurgist, Clark Equipment Co., Buchanan, Mich., for the last 11 years, covering steel foundry and metallurgical control, including heat treating and fabrication. A graduate of Michigan State College, he previously was research engineer at the Michigan Engineering Experiment Station, East Lansing, Mich., where he was engaged in research on gray iron metallurgy. Mr. Surls is a director of the Michiana Chapter of the AFA, and a member of American Society for Metals.

♦ ♦ ♦

Alfred J. Yardley has been elected president of Jenkins Bros., Bridgeport, Conn., succeeding his father, **Farnham Yardley,** who has been made chairman of the board of directors, after serving as president of the company for the last 30 years. Alfred J. Yardley, a great grandson of Nathaniel Jenkins, the founder, joined the company in 1932. **James L. Dunn,** since 1944 vice president in charge of industrial relations, and **C. C. Chamberlain,** general sales manager for the last 4 years, have been elected to the board of directors.

♦ ♦ ♦

John H. Staiger has been appointed representative of the alloy division of the Michiana Products Corp., Michigan City, Ind., in the Chicago territory, with headquarters in Chicago. Mr. Staiger, a graduate metallurgical engineer, succeeds **L. J. Bohan** as Chicago territory representative. **William A. Zach** has been appointed representative of the alloy division in the Indiana territory, with headquarters at the Michigan City plant. Mr. Zach was formerly assistant chief engineer there.

♦ ♦ ♦

L. Sulprizio has been elected president and general manager, United Engine & Machine Co., San Leandro, Calif. **R. Sulprizio** has been named vice president, treasurer, and assistant general manager, and **LeRoy H. Guntner,** secretary. **Ben L. Moyers,** formerly vice president and treasurer, has retired from active participation but will remain a member of the board of directors of the company.

♦ ♦ ♦

George F. Naumann has been appointed manager of the Edwardsville, Ill., plant of the United States Radiator Corp., Detroit, succeeding the late **T. C. Hamlin.** Mr. Naumann has been associated with the company for 31 years and has been office manager for the last 15 years. Except for brief periods in St. Louis and Milwaukee, he has been stationed at the Edwardsville plant.

♦ ♦ ♦

Lyndon C. Cole has been appointed chief engineer of the machine division, the Osborn Mfg. Co., Cleveland, in charge of engineering and design of the company's foundry equipment. Mr. Cole was previously associated with the Cleveland Automatic Machinery Co., Cleveland, as chief engineer, and the Cleve-

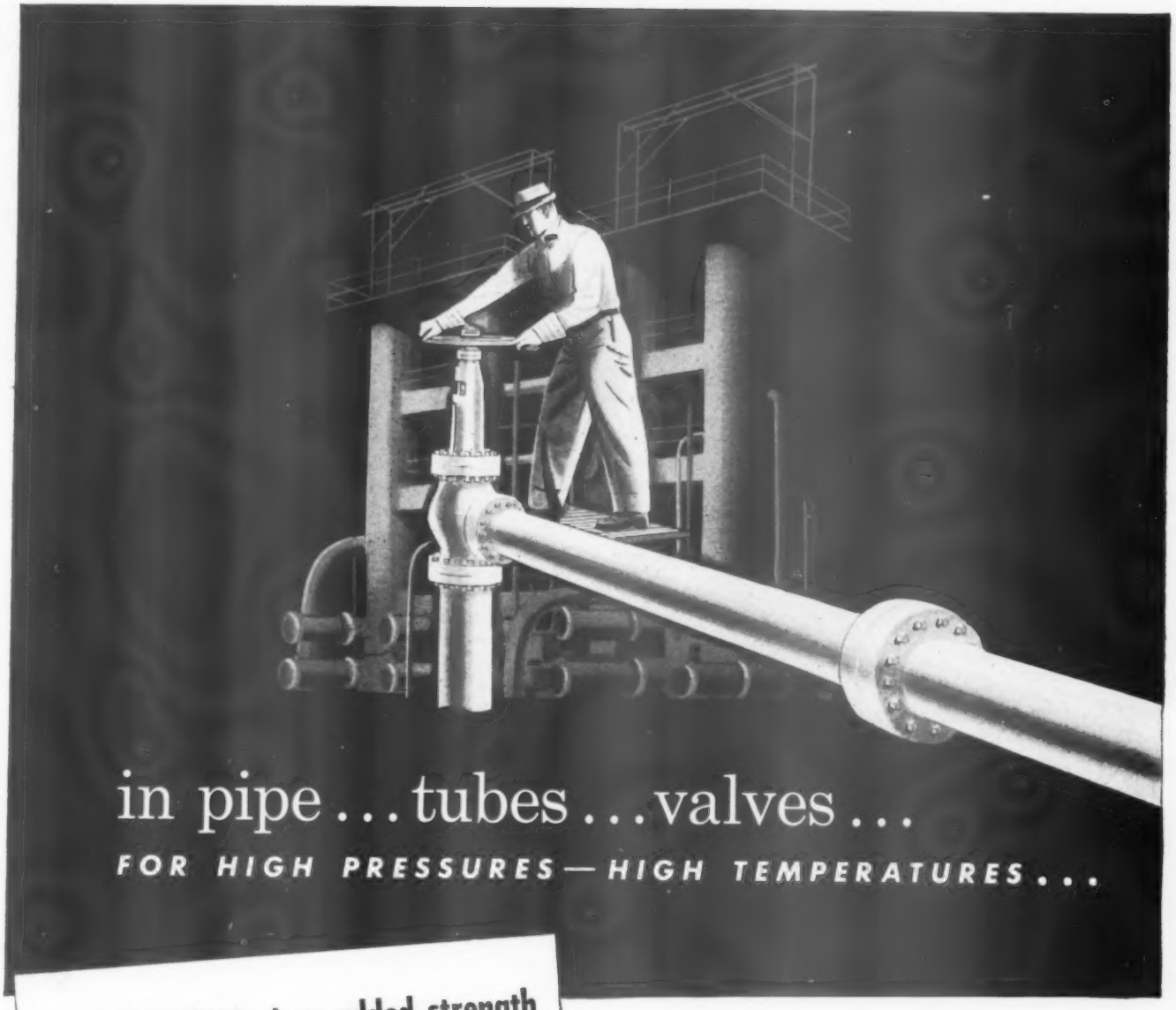
(*Continued on page* 108)

H. B. SWAN

DAVID L. PARKER

HAROLD MYERS

M. F. SURLS



in pipe . . . tubes . . . valves . . .

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MOLYBDENUM gives added strength to wrought or cast ALLOYS . . .

In equipment for producing aviation gasoline and synthetic rubber . . .

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In many of the most exacting applications, pipe, tubing, valves, controls, heat exchangers are fortified against high pressures, high temperatures or both by employment of Molybdenum-alloyed steels and irons.

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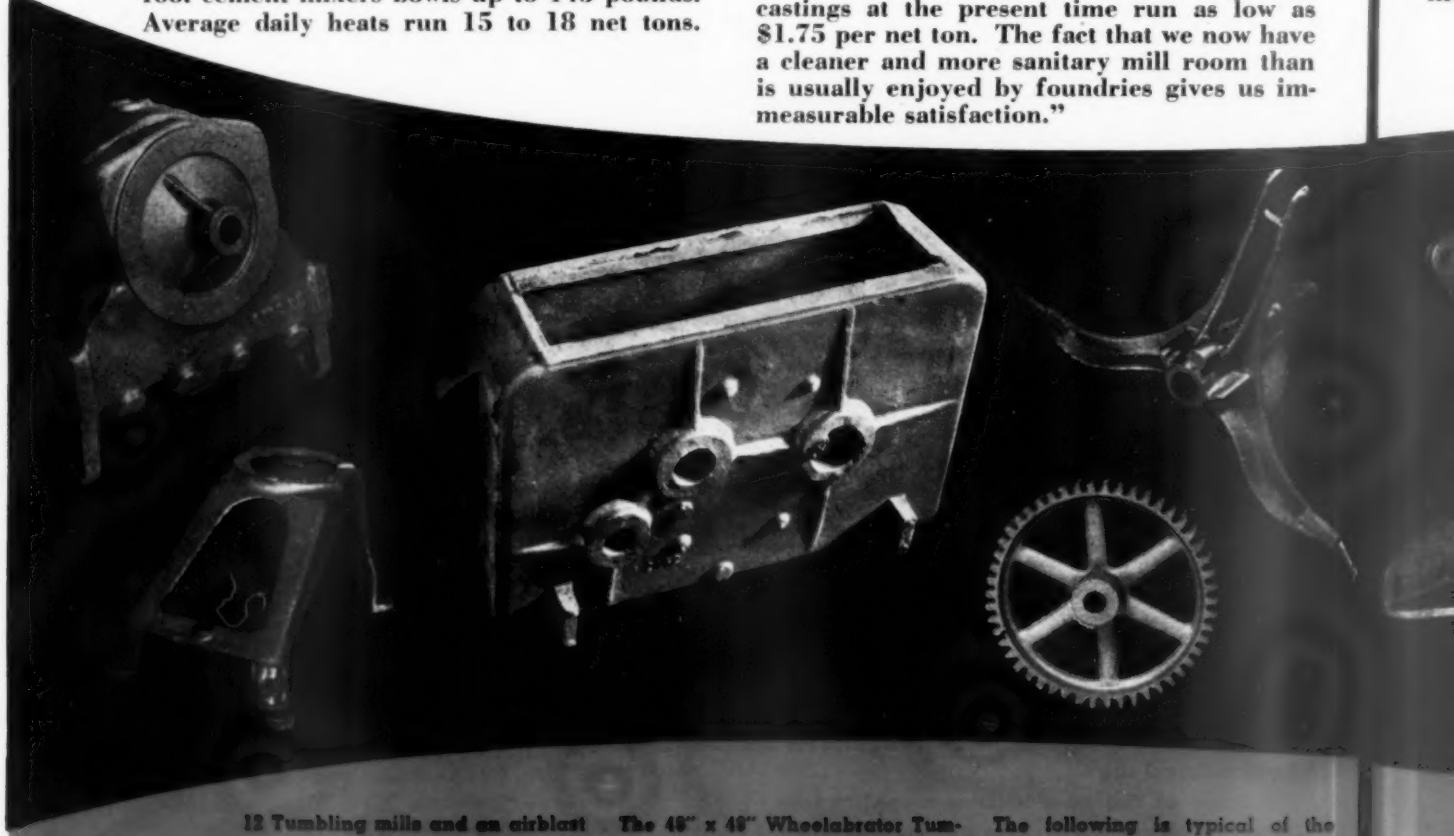
The production manager of a well-known farm implement manufacturing concern has this to say about the airless Wheelabrator:

"The type of work done in our foundry runs from light agricultural castings — 1 to 35 pounds — to tractor manifolds and 3 cubic foot cement mixers bowls up to 145 pounds. Average daily heats run 15 to 18 net tons.

"Your Tumblast, size 48" x 42", replaced 3 tumbling mills and the men it would take to operate them. Since labor is the biggest item in figuring cost, one can readily see the savings enjoyed by having this machine.

"Our cleaning costs are only ⅓ of what they were in former years. Labor costs of cleaning castings at the present time run as low as $1.75 per net ton. The fact that we now have a cleaner and more sanitary mill room than is usually enjoyed by foundries gives us immeasurable satisfaction."



Reports From Users in the Field

12 Tumbling mills and an airblast room were replaced by a 66" Wheelabrator Swing Table at Western Land Roller Co., Hastings, Nebraska. 10 to 14 tons of grey iron castings are cleaned in from 6 to 8 hours. Typical work, which is completely cleaned in 4 minutes, includes 3' x 4' side frames, irrigation pump castings, feed grinder blowers, turbine pump heads, bowl assemblies, etc.

The 48" x 42" Wheelabrator Tumblast at Continental Gin Co., Birmingham, Alabama cleans the entire daily production in about 2 hours. It previously required 8 hours to clean these castings using 8 tumbling barrels. An average load in the Wheelabrator Tumblast consists of 1400 lbs. of mixed castings, and the cleaning time ranges from 5 to 8 minutes.

The following is typical of the fast cleaning effected by the 66" Wheelabrator Swing Table installed at Massey-Harris Co., Ltd., Brantford, Ontario:

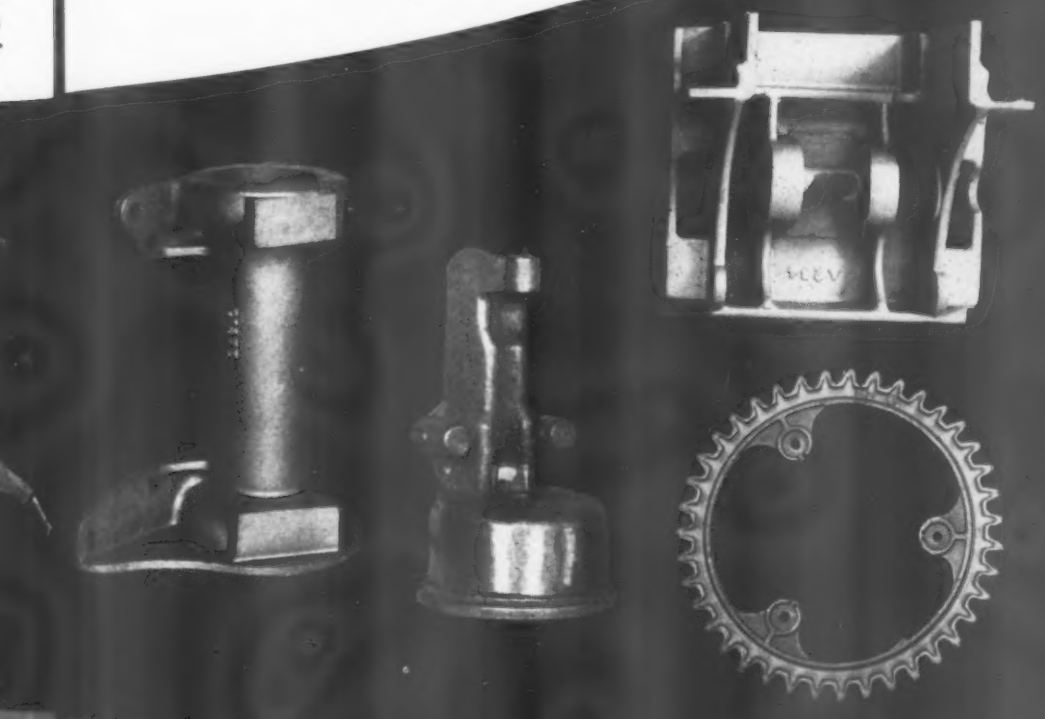
Mower frames — two minutes per side; 200 pound beams for disc plows — four minutes.

These castings contain heavy cores and are heavily encrusted with sand.

d cleaning... cost reduction

M IMPLEMENT MANUFACTURERS

Performance records like this, and those shown below, are typical of Wheelabrator's efficiency and versatility in cleaning farm implement castings. What the airless Wheelabrator has done for others, it can do for you. Ask for a demonstration... or write for further information on how to increase *your* cleaning efficiency.



Typical Implement Foundries using WHEELABRATOR

- International Harvester Co.
- David Bradley Mfg. Co.
- The Oliver Corporation
- Massey-Harris Co., Ltd.
- Western Land Roller Co.
- Allis Chalmers Mfg. Co.
- Continental Gin Co.
- The Challenge Co.
- J. I. Case Co.
- The American Fork & Hoe Co.
- John Deere Tractor Co.
- Wood Bros. Thresher Co.
- Minneapolis-Moline Power Implement Co.
- Kansas City Hay Press Co.
- Dempster Mill Mfg. Co.
- Red Jacket Mfg. Co.
- Starline, Inc.
- Letz Mfg. Co.
- Wm. E. Pratt Mfg. Co.
- Hawkeye Steel Products Co.
- Bennett-Ireland, Inc.
- Krause Plow Co.
- Moline Iron Works
- Athens Plow Co.
- The Union Fork & Hoe Co.
- Turner Mfg. Co.
- Moore Plow & Implement Co.
- Big Rock Plow Co.
- Cockshutt Plow Co., Ltd.
- Petersen Mfg. Co.
- Climax Engineering Co.

American

WHEELABRATOR & EQUIPMENT CORP.

(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)

505 S. Byrkit St., Mishawaka, Indiana

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

(*Continued from page* 104)

land engineering office of the Hydraulic Press Mfg. Co., Mount Gilead, O.

♦ ♦ ♦

E. Halsey Brister has been appointed sales manager, Bay State Abrasive Products Co., Westboro, Mass., succeeding the late **Arthur G. Green.** Mr. Brister, a graduate of Stevens Institute of Technology, has been associated with Bay State since 1944, as quality control manager. Prior to that he spent three years with the Electro Refractories Co., Buffalo, in charge of production of resinoid and vitrified abrasive products. For a period of 13 years he was associated with the Norton Co., Worcester, Mass., engaged in sales research and laboratory development work.

♦ ♦ ♦

Mildred Anne FitzPatrick, executive secretary in the Detroit office of Vanadium Corp., New York, on May 1 marked the 25th anniversary of her association with that office. A graduate of Queen's University, Kingston, Ont., she became Detroit office secretary in 1922 and from sales of vanadium exclusively she has seen the company's list of products expand to include a variety of ferroalloys, metals, carbides and chemicals, including alloys employed in foundry practice. Through long association with leaders in the metals industries, she has acquired considerable knowledge of metallurgy.

♦ ♦ ♦

Jess Toth, secretary of the Harry W. Dietert Co., Detroit, has been selected as the recipient of the "Key Man" award by the Detroit Junior Board of Commerce. The award is given in recognition of distinguished service in connection with Junior Board of Commerce activities.

♦ ♦ ♦

Edgar F. Schaefer has been elected president, the Gardner-Denver Co., Quincy, Ill., succeeding **H. G. Myers,** who has been made chairman of the executive board. Mr. Schaefer joined the company in 1919. He was elected vice president in 1926 and executive vice president in 1942. Mr. Myers, who succeeds the late **J. W. Gardner,** has been associated with Gardner-Denver since 1927 when he was appointed chief engineer. In 1929 he was made executive vice president and in 1935 was elected president.

♦ ♦ ♦

C. R. Harmon, until recently sales manager, Penn Carbide & Alloy Casting Co., has been appointed Pittsburgh district sales manager, Firth Sterling Steel & Carbide Corp., McKeesport, Pa. Mr. Harmon was associated previously with Jessop Steel Co., Washington, Pa., and Crucible Steel Co. of America, New York.

♦ ♦ ♦

Walter J. Kohler Jr. has been elected president, Vollrath Co., Sheboygan, Wis. Mr. Kohler recently resigned as secretary of the Kohler Co., Kohler, Wis. **J. M. Detling** has been elected treasurer and chairman of the board, Vollrath Co. Other officers elected are: **J. C. Vollrath,** vice president; **R. P. Vollrath,** secretary; and **H. E. Schroeder,** assistant secretary-treasurer.

♦ ♦ ♦

Richard M. Marshall, formerly executive vice president, Pittsburgh Coke & Chemical Co., Pittsburgh, has been elected president, succeeding **J. H. Hillman Jr.,** who has been named chairman of the board of directors. Mr. Marshall joined the company in 1941 and was formerly vice president and general manager, Woodward Iron Co., Birmingham, and vice president, Sloss-Sheffield Steel & Iron Co., of that city. **G. E. Dignan,** formerly works manager at the Neville Island plant, has been elected vice president of operations. Mr. Dignan became associated with the company in 1929 as chief engineer. **W. S. Scott,** formerly general manager of sales, has been appointed vice president of sales. He joined the company in 1928. Three other officers were re-elected including **T. W. Kirkpatrick,** secretary; **H. R. Mustard,** treasurer and comptroller; and **J. E. Hirleman,** assistant treasurer and assistant comptroller.

♦ ♦ ♦

Harry C. Martin, assistant technical director, Carborundum Co., Niagara Falls, N. Y., has been appointed technical director, succeeding **Otis Hutchins,** who has retired because of ill health, following 35 years of service. **Donald G. Foot** has been made administrative assistant to Mr. Martin. **Edward R. Newcomb,** formerly a regional sales manager, has been appointed director of sales engineering of the coated abrasive division. **Boyd H. Work,** formerly manager of the sales engineering division, has been made director of sales engineering for the United States and Canada, for the bonded abrasive division. **George J. Easter,** formerly director of research, has been appointed manager of research and development, with **Charles Woodell** and **Garret Van Nimwegen** as assistant managers. **Henry R. Power,** previously chief chemist, has been made manager of laboratories, with **F. P. Ronca** and **Walter G. Lautz** as assistant managers. **Fred A. Upper** has been named manager of manufacturing technical service, with **Arthur H. Prey** as assistant.

♦ ♦ ♦

Isadore Glueck has been appointed secretary-manager of the Nonferrous Ingot Metal Institute, Chicago, succeeding **R. D. T. Hollowell,** who has retired following 20 years in that position.

♦ ♦ ♦

Pasquale Arpea has joined Overton Foundry, South Gate, Calif., as part owner. Mr. Arpea has been associated with Axelson Mfg. Co., Los Angeles, for

(*Concluded on page* 110)

E. HALSEY BRISTER

MILDRED ANNE FITZPATRICK

JESS TOTH

EDGAR F. SCHAEFER

No snagging job is too tough for BAY STATE to handle. From large resinoid floor stand snagging wheels to small mounted wheels for portable grinders, BAY STATE is fully equipped to serve you. Disc wheels, core files, rubber, resinoid or Bayflex cut-off wheels are but a few of the other BAY STATE Foundry products. In many cases your required specifications can be supplied immediately from strategically located distributor stocks.

A new heat resistant bond and a more friable type of abrasive is worth your investigation.

Branch offices and warehouses — Chicago, Detroit
Distributors — All principal cities

BAY STATE

Top Performance Consistently Duplicated

BAY STATE ABRASIVE PRODUCTS CO. • WESTBORO, MASSACHUSETTS, U.S.A.

the last 22 years as coremaker, coreroom foreman, assistant foundry foreman and for the last 17 years as foundry superintendent.

♦ ♦ ♦

Alexander W. Lansberg, secretary-treasurer, and **John S. Csaklos,** works manager, Hartford Electric Steel Corp., Hartford, Conn., have been appointed vice presidents. Mr. Lansberg joined the company as asssitant treasurer in 1942 and became secretary-treasurer 2 years later. Mr. Csaklos was appointed works manager in charge of production and foundry operations last October following 18 years as foundry superintendent at Reading Steel Casting Division, American Chain & Cable Co., Reading, Pa. **Robert T. Clarke** has been appointed assistant secretary-treasurer, succeeding **Thomas M. Ecker,** who has been made assistant to the president.

♦ ♦ ♦

Robert C. Schellenberg, maintenance foreman, American Stove Co., St. Louis, has been retired, following 50 years of service with the company. Mr. Schellenberg joined the stove company at the age of 14 and has two sons, Ellsworth and Robert Jr., and a brother, who are associated with the company also.

♦ ♦ ♦

J. T. Jackson, president, and **L. P. Jackson,** vice president, Mid-West Abrasive Co., Detroit, left recently by plane to study trade conditions and possibilities for immediate and long-range export business in various European countries and the Near East.

♦ ♦ ♦

Carl Fisher, who for 14 years has been associated with Superior Foundry Inc., Cleveland, has been appointed purchasing agent.

♦ ♦ ♦

Captions accompanying the pictures of **G. J. Nass** and **L. O. Hofstetter,** West Coast Foundry Equipment Co., as presented in the April issue, were transposed. The company recently was appointed sales representative of Osborn Mfg. Co., Cleveland.

♦ ♦ ♦

Robert Hannan has been appointed district representative for the Beardsley & Piper Co., Chicago, in northern Illinois, Iowa, Wisconsin, Minnesota and the peninsula of Michigan. Mr. Hannan,

ROBERT HANNAN

who has been associated with the company for 6 years, was formerly a service representative for the company, his experience including work in the development, construction and installation of various Beardsley & Piper products.

♦ ♦ ♦

E. F. Tibbetts has been appointed metallurgical engineer, the Lummus Co., New York, designers and builders of petroleum refineries and chemical process plants. Mr. Tibbetts was formerly assistant materials engineer for the Shipbuilding Division, Bethlehem Steel Co., Quincy, Mass.

♦ ♦ ♦

W. J. Hazeltine has been appointed vice president and sales manager, Galion Iron Works & Mfg. Co., Galion, O. Mr. Hazeltine was formerly vice president and sales manager of the Buffalo-Springfield Roller Co., Springfield, O., with which he had been associated 26 years.

♦ ♦ ♦

W. E. Bagwell has been appointed purchasing agent for Hoosier Iron Works Inc., West Morgan and Webster Sts., Kokomo, Ind.

♦ ♦ ♦

Thomas Hargitt has been appointed superintendent, Light Metals Inc., Indianapolis, producer of magnesium castings.

G. J. NASS

L. O. HOFSTETTER

Booklet Describes Job Evaluation

A special report in booklet form issued by Labor Relations Institute, 1776 Broadway, New York 19, and titled *How To Control Your Labor Costs Through Job Evaluation,* analyzes tested techniques of job evaluation and presents a description of the advantages of the four principal job evaluation systems, with charts and diagrams for each. It lists the problems in installing a system and suggests procedure and contract clauses to assure union-employee co-operation and successful operation of the system. Job evaluation is now within the reach of small and moderate size plants. However, installation of a system requires the services of a specialist who has had extensive experience with these problems.

Metal Guild Plans Annual Meeting

Fifteenth annual meeting of the Electric Metal Makers Guild Inc. will be held at Hotel Roosevelt, Pittsburgh, June 5 to 7. The speaker at the annual banquet will be William H. Colvin Jr., president, Crucible Steel Co. of America, New York.

John E. Arthur, Crucible Steel Co. of America is president of the guild; Ray H. Frank, Bonney-Floyd Co., Columbus, O., is vice president and Donald L. Clark, Simonds Saw & Steel Co., Lockport, N. Y., is secretary-treasurer.

Companies Merge

Lindberg Engineering Co., 244 West Hubbard St., Chicago 12, manufacturer of heat treating furnaces and electrical equipment, and Fisher Furnace Co., Chicago, manufacturer of nonferrous melting furnaces, refractories and blowers, have merged. Under the new arrangement the Fisher organization will be known as Fisher Furnace Division, Lindberg Engineering Co. Fisher furnace manufacturing and office activities have been moved to 2444 West Hubbard St. Refractories will continue to be manufactured at 5535 North Wolcott, Chicago.

A cyclone and a Sly Dust Filter collect dust from grinding and conditioning operations on non-ferrous castings. The Sly Dust Filter is needed to collect completely all the fine dust which the cyclone could not catch.

SLY DUST Control

Gets ALL the Dust —EVEN THE VERY FINE DUST

it is the FINE DUST which does the damage . . .

The *fine dust* works its way into the bearings and other moving parts of machinery and settles widely over plant and neighborhood.

Only the *fine dust* is injurious to the human body. The coarser particles are stopped by the nose and mouth; only the very fine particles enter the respiratory system.

A combination of a Sly Dust Filter and a cyclone Collector is not uncommon. Often the cyclone does not collect the fine dust. Then a Sly Filter is added to get it all.

Sly Dust Collectors are not expensive —in first cost, maintenance, operation. Ask for Bulletin 98 and tell us your problem so that we can write you fully.

THE W. W. SLY MANUFACTURING CO. • 4753 TRAIN AVENUE • CLEVELAND 2, OHIO

SLY INDUSTRIAL DUST CONTROL

TUMBLING MILLS • BLAST CLEANING EQUIPMENT

Pours Castings In Dry Sand Molds

(*Continued from page* 93)

amount of new bank sand is added to the clear silica or sharp sand. In others —for example, thin manifold jacket cores, where high permeability is the most important factor—the new bank sand is omitted from the mixture. Many small cores which under former conditions showed an annoying tendency toward burning in and metal penetration, are subject to this complaint no longer. The cure was brought about by adding a small amount of iron oxide, approximately 2 per cent, to the sand mixture.

Use of synthetic sand first was attempted in 1944. Nearly a year elapsed before all the wrinkles and bugs finally were ironed out. A constant dry permeability of around 100 and green strength of 5 to 6 lb are maintained by using the following ratios: Blended pitch base compound 1 part binder to 90 parts sand, and 1 part bentonite to 125 parts sand. Same grade of facing is used for all classes of castings ranging in weight from 100 to 22,000 lb.

Castings are shaken out on an 8 x 10-ft dual unit capable of handling loads up to 15 tons. From under the shakeout the sand passes through a sand conditioning system and is delivered by belt into hoppers over a battery of jolt rollover molding machines, one 6000, one 20,000 and two 10,000 lb capacities. In another section of the main bay molds are made on one 1500 lb high-speed machine and one 1000 lb machine delivering onto roller conveyors. These machines are served by overhead hoppers filled at night with sand from a 42-cu-ft capacity bucket suspended from the crane. Dust at the shakeout is eliminated through a dust collector with a capacity of 31,000 cfm.

Castings of all kinds, large and small, are cleaned in a hydroblast installation where water mixed with sand is fed through a hose and driven under high pressure against exterior and interior faces of the castings. Cleaning time, especially on large cored castings has been reduced to a remarkable extent and chipping time reduced by 25 per cent. From 150 to 200 tons of sand per month are reclaimed through this method. All the sand is placed back in circulation. The greater part goes into black sand cores, the remainder incorporated in the facing mixture. Formerly all cleaning room sand was hauled away to the dump. Incidentally, the former dumping ground between the plant and an adjoining creek has been leveled, graded and converted into an attractive and convenient parking yard.

The main bay of the foundry is spanned by three 15-ton capacity cranes, two with 5-ton auxiliary hoists. Several jib cranes project from the columns in the vicinity of the casting pits and other points where molds receive many cores. These devices relieve the traveling cranes of a great deal of light detail work. The coreroom is serviced by one cage-operated electric traveling crane and by two 2-ton electric floor-operated cranes employed principally on the core assembly floors at each end of the bay. The side floor is serviced by one 3-ton electric, floor-operated crane over one section and by a monorail system for conveying and pouring metal at the other end. Raw material yard, all under cover, is served by one 10-ton crane. Casting stock yard is serviced by a 7-ton caterpillar crane. A 10-ton electric traveling crane handles the work in the cleaning room.

(*To be concluded next month*)

CONFERENCE DISPLAY: A feature at the recent Wisconsin regional foundry conference was a display sponsored by Allis-Chalmers Mfg. Co., Milwaukee, of hygiene instruments used to evaluate foundry atmospheric conditions, as well as personal protective equipment of the type worn by the company's foundry workers. Shown, left to right, inspecting an explosive meter, part of the display, are: George Marshall, assistant metal industries specialist, Allis-Chalmers Mfg. Co.; Sheldon V. Wood, national AFA president and president of Minneapolis Electric Steel Castings Co., Minneapolis, and Harry E. Ladwig, works manager, Allis-Chalmers foundries and pattern shops

Acid Open Hearth Association Meets

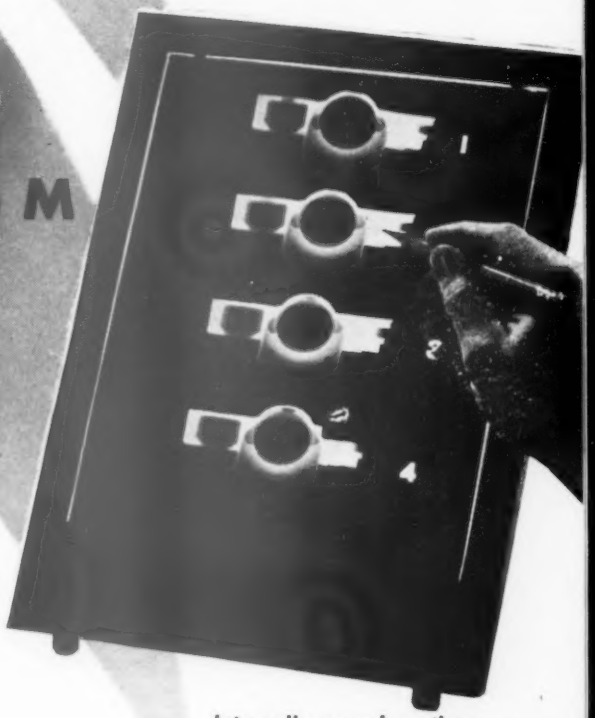
The Acid Open Hearth Research Association, 901 Bingham St., Pittsburgh 3, held its regular bi-monthly session Mar. 10. Dr. G. R. Fitterer, director of research, University of Pittsburgh, and member of the association's research staff, presented the results of the staff's recent work—the study of effects of furnace operations on the physical properties of high carbon steel, correlation of data on the sulphur content of acid open-hearth steel, some temperature measurement phenomena, distribution of chromium between the slag and metal and the constitution of chromium compounds in the slag.

Use of oxygen in the acid open-hearth furnace is a prominent question, and the association proposes to conduct research work on the subject at one of the plants of the association.

Total acid open-hearth melt during 1946 was 1,132,199 tons. This was a reduction of 20 per cent from 1945 which in turn was 27 per cent lower than that of 1944.

Q. Which x-ray film is first choice for 100-kv radiography of die castings?

A. Kodak's Type M



Internally sound castings, ready for machining

Finding defects in aluminum die castings like these *after* machining starts is an expensive proposition.

To avoid this expense, the production-minded manufacturer — or the foundryman anxious to produce a quality product and keep customer good will — institutes a system of radiographic spot checking . . . using Kodak's Industrial X-ray Film, Type M.

Why Type M?

Because this particular Kodak Film gives you the best possible rendition of radiographic detail. Because it's as well adapted to inspection of these small alloy castings with 100-kv equipment as to inspection of heavy alloy parts with million-volt equipment.

The economical way to assure continuous production flow

Used in foundries to test efficiency of experimental casting technics, soundness of new designs . . . or in machine shops to "screen out" faulty parts before machining . . . radiography has more than paid its way in hundreds of plants. No reason why it won't in yours! Ask your x-ray dealer for information, or write...

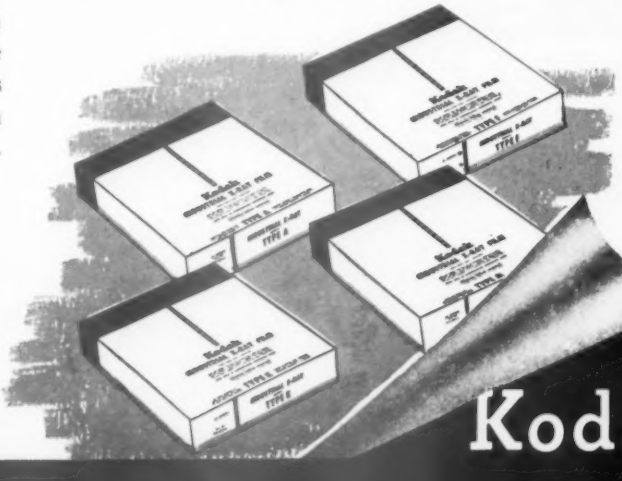
Eastman Kodak Company
X-ray Division · Rochester 4, N. Y.

Other Kodak X-ray Films for Industry

Kodak Industrial X-ray Film, Type A . . . most often used for light alloys at lower voltages and for million-volt radiography of thick steel and heavy alloy parts.

Kodak Industrial X-ray Film, Type F . . . with calcium tungstate screens—primarily for radiography of heavy steel parts. The fastest possible radiographic procedure.

Kodak Industrial X-ray Film, Type K . . . primarily for gamma- and x-ray radiography of heavy steel parts, or of lighter parts at limited voltages where high film speed is needed.



Radiography

. . . another important function of photography

Kodak

OBITUARY

WILLIAM D. GOLDSMITH, 59, owner, C. A. Goldsmith Foundry, Newark, N. J., died Apr. 2, at his home in Princeton, N. J. Mr. Goldsmith was born in Brooklyn, N. Y., and attended Princeton and Lehigh Universities. He was vice president of the former Newark Foundrymen's Association for several years, vice president of the Metropolitan Brass Founders' Association, and was elected a national director of the American Foundrymen's Association in 1927.

• • •

Herbert L. Grapp, 52, president of the Despatch Oven Co., Minneapolis, died suddenly Mar. 22, while on a vacation trip in California, Mr. Grapp was the son of **A. E. Grapp,** founder of the company, whom he succeeded as president last year when the latter became chairman of the board of directors. Herbert Grapp joined the company over 28 years ago and was instrumental in building up a large national organization with headquarters and factory in Minneapolis, a field engineers' office in Chicago, and engineering representatives in principal American and foreign cities.

• • •

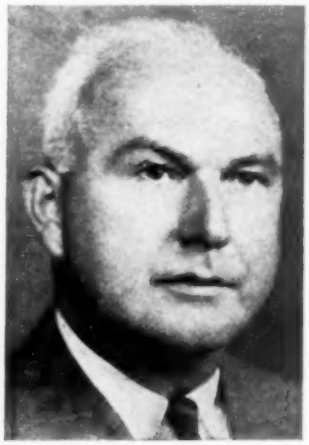
John D. Babbitt, foundry supply manufacturers representative for many years, died Mar. 30 after a short illness at his home in Columbiana, O. He was buried at Corry, Pa., his boyhood home where he grew up and learned the molder's trade. For a period of 30 years he was foundry superintendent, Jos. Reid Gas Engine Co., Oil City, Pa. Later connections in a similar capacity included the Willsea Works, Rochester, N. Y., and the Straight Line Engine Co., Syracuse, N. Y. For the past 10 years in the Midwest territory he represented the combined Supply & Equipment Co., Buffalo; Cleveland Flux Co., Cleveland, and the Standard Horse Nail Corp., New Brighton, Pa.

• • •

R. P. Morgan, 66. New England representative of the Herman Pneumatic Machine Co., died Mar. 25 at his home in Springfield, Mass. He was born in Oil City, Pa., where he later served his time and worked in the plants of the Oil Well Supply Co., and the Jos. Reid Gas Engine Co. After a term as superintendent of what is now the Cooper-Bessemer Corp., Grove City, Pa., he joined the Herman Pneumatic Machine Co., as sales and service engineer in 1916. In 1924 he was assigned the New England territory. In 1929 he supervised the installation of Herman machines in the sand spun pipe plant of the Stavely Coal & Iron Co., Ltd., Chesterfield, England. Late in 1935 he supervised the installation of many Herman machines in plants of the Soviet Union. He returned to the United States 9 months later and since that time represented the Herman company in the New England states and the Eastern Canadian provinces. He was prominently connected with the New England Foundrymen's Association.

• • •

Arthur G. Green, 51, sales manager of the Bay State Abrasive Products Co., Westboro, Mass., died Mar. 6 at Memorial Hospital, Worcester, Mass. Mr. Green was a graduate of Worcester Polytechnic Institute. Before he joined Bay State Abrasive Products Co. in 1944, he was associated with Norton Co., Worcester, Mass. for 27 years.



ARTHUR G. GREEN

• • •

Roland F. Benzinger, 55, president, the Electric Furnace Co., Salem, O., died Mar. 25, at his home in Salem, following an illness of 22 months. Mr. Benzinger, a native of New York, was widely known throughout the metalworking industry. He was one of the founders of the Electric Furnace Co., having served as its vice president and secretary for 14 years and as president since 1937. He served as president of the Industrial Furnace Manufacturers Association for several years.

• • •

Alois M. Siess, 59, foundry manager, W. S. Tyler Co., Cleveland, died suddenly Apr. 12, at his home in that city. Mr. Siess had been associated with the company for 42 years, and was the son of Nicholas Siess, one of its original employees, who had worked there 44 years before his death. He was a member of the Northeastern Chapter of the American Foundrymen's Association.

• • •

John H. Baehr, 78, secretary-treasurer of the Eberhard Mfg. Co., Cleveland, at the time of his retirement in 1933, died there Mar. 11. Mr Baehr was born in New York and went to Cleveland early in his youth. He became associated with the company as an office boy and retired as an executive following 50 years of service.

• • •

E. L. Berry, 52, vice president in charge of production, Link-Belt Co., Chicago, died Apr. 3, in Chicago, following a heart attack. Mr. Berry joined the company in 1914 as machinist and subsequently became rate setter, subforeman of shop, head of time study department, works engineer, general superintendent and assistant general manager. He became vice president in 1944 and was also a vice president and director of Link-Belt Speeder Corp.

• • •

S. Frederick Kemper, 79, president, the Cincinnati Die Casting Co., Cincinnati, died there Mar. 24, following a heart attack. He was a former president of American Pumps Inc., Cincinnati, and had been associated with it for 20 years before he founded the die casting company in 1936.

• • •

Frederick C. Warhus, 86, secretary and treasurer, Buffalo Co-operative Stove Co., Buffalo, when he retired in 1937, died Mar. 11, at his home in that city. Mr. Warhus for 50 years was associated with the stove company, name of which was changed to Amherst Foundry Inc. over a year ago.

• • •

William W. Hale, 61, president of Scientific Cast Products Co. and the Art-in-Bronze Co., Cleveland, died March 9, at his home in Shaker Heights, O. Mr. Hale, a graduate of Yale University, had been an executive in the two companies of which he was president, for many years.

• • •

John Johnson, 85, who retired 11 years ago as superintendent, Tarrant Foundry Co., Chicago, after an association of 50 years with the company, died Mar. 19, in that city. Mr. Johnson began his career in a foundry in Scotland at the age of 9, at which time apprenticeship required 7 years.

• • •

Herman C. Neitzel, 64, assistant purchasing agent, Chandler & Price Co., Cleveland, died Mar. 20, in that city. A native of Cleveland, Mr. Neitzel attained considerable local fame for ornamental pieces in bronze which he modeled and cast in his home.

• • •

James L. Linsley, 66, who retired a year ago as secretary of Eastern Malleable Iron Co., Naugatuck, Conn., died Mar. 5, in Delray, Fla. Mr. Linsley was graduated from Williams College in 1903. He remained a director of the Company at the time of his retirement.

CORES *for* SALE

Now in our 5th year making sand cores of all types for the foundry industry

LET US BE YOUR AUXILIARY CORE ROOM DEPARTMENT

* Convinced that our idea of making and selling cores to order for the foundry trade was sound, we first offered this service in August 1942. We have outgrown three plants which indicates the acceptance of the idea! We make cores of finest quality which after baking, are cleaned, inspected and packed in cartons for truck shipment to you. Just send us your core boxes, specify type of metal poured and we will do the rest.

If your coreroom is a bottleneck or overloaded, we can help you. Now in our fifth year, we specialize in making cores for all types of foundries. Illustrated is a view of our new plant, complete with the latest core-making and core-baking equipment for fast production of high quality cores. We are regularly serving foundries as far as 300 miles distant. For the foundry having no coremaking facilities and foundries needing a supplemental source of supply for good cores, our service has proven most satisfactory. We invite your inquiries.

THE Coremakers, Inc.

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MAKERS OF SAND CORES FOR THE FOUNDRY INDUSTRY

Around DETROIT

By A. H. ALLEN
Detroit Editor
THE FOUNDRY

New technique in molding crankshafts results in improved product and lower manufacturing costs . . . . Interesting features incorporated in automotive foundry improvement programs

NOVEL revision in crankshaft molding technique at the gray iron production foundry of Ford Motor Co. has resulted in stronger crankshafts, reduction in service problems and a considerable saving in manufacturing costs. The shafts are poured vertically, with four molds set on a hanger which travels on a continuous conveyor. Formerly small cylindrical inserts or chills were suspended near the bottom of the mold to accelerate heat dissipation and promote progressive solidification from the bottom upward. The chills became integral parts of the casting and since fusing often was not complete because of gas pockets, foreign material adhering to the metal, etc., occasional structural weakness developed at this point in the shaft.

The new technique utilizes the cooling capacity of the conveyor hangers themselves, as shown in the illustrations on page 120, eliminating the sand core formerly placed at the base of the mold. The steel base plate dissipates heat 30 times as fast as the sand core could, and hence there is no need for the inserted chills.

Shafts produced under the revised system show improved metallurgical qualities, and there are fewer scrapped castings. In addition, drill breakage has been reduced by approximately 75 per cent. High breakage formerly encountered resulted from the necessity of penetrating the softer chill insert when drilling oil holes through the No. 1 crankshaft and crankpin bearings.

The change is a simple one and, like many such apparently insignificant modifications, has been most effective both from the standpoint of improving the product and reducing production costs.

• • •

AN INTERESTING feature of the new $3 million coreroom which is now in production on jacket cores for the Ford V-8 engine is an automatic arrangement for dipping and spinning a complete core assembly. Until recently, each of the 40 or more sections of the core was dipped separately, dried in ovens separately and then assembled into the final unit. Although paste was used in assembling the various sections, there was always the hazard that joints might not be perfect fits, allowing molten metal to flow into the crevices and form fins on the inside of the block casting and possibly restrict water passage.

The new setup provides special fixtures on a continuous conveyor, on which a complete core assembly is fitted. The conveyor carries the core through a dipping tank located in a pit below the core handling section, and as it emerges from the tank a gear engages with a worm screw on the fixture and spins it slowly to remove excess coating compound. The cores are baked and move on in conventional fashion to the molds. By handling the core as a complete unit, a much better job is accomplished structurally, while the automatic dipping and spinning equipment eliminates to a considerable degree the amount of manual labor formerly necessary in manufacturing these cores.

Many other improvements are being made in other Ford foundry departments in connection with the $12 million foundry modernization program which has been under way for the past year or more. Convention visitors to Detroit were slated to get a peek at some of them on May 2 when the company was host to AFA members and their guests. In the past, the visitor to the Ford production foundry at first glance received an impression of utter confusion and congestion. Conveyor lines, equipment and men looked to be compacted into restricted working areas, and the entire scene was clothed in smoke, flame and noise. Actually, it was not quite as bad as it looked, considering the amount of tonnage being handled every day and the speed which is necessary to keep materials moving.

However, steps are being taken to "open up" operations a little more, improve ventilation further and in general to make working conditions more pleasant. It is a continuing program and probably in another year the operations will look even different than they do today.

Convention visitors were highly impressed with the new Cadillac gray iron foundry, which has been in process of reconstruction the last two years. Layout has been completely changed and additional floor space added. More conveyors have been installed, one of the most spectacular being the one for controlled cooling of blocks after they come from the shakeout.

Studies which Buick, Olds and Pontiac are making in respect to new type V-8 engines for possible introduction two or three years from now are interesting from a number of angles. In the first place they reflect the desire by designers to develop shorter power plants so that seats can be moved forward to give a better ride. Present straight-eight engines will permit no shortening in the motor department, so it is a matter of either moving engines to the rear, or developing new units.

Beyond this, however, is the recognition of the vibration problem in crankshafts of the straight-eight engine, plus troubles which are experienced in getting uniform fuel distribution, particularly in end cylinders. The V-8 engine, while perhaps more costly to build than the straight-eight, does have advantages in respect to fuel distribution.

Cast Sample Cylinder Blocks

There is, of course, no certainty these General Motors divisions definitely are going to change to the V-8 engine, but sample lots of blocks have been cast at Pontiac and Buick, with new flasks purchased to accommodate them. Reportedly consideration is even being given to a V-8 engine as a possibility in the proposed Chevrolet light car, scheduled to be built in Cleveland some time in the future. Decision on whether to proceed with the light car program was scheduled to have been made on Mar. 13, but a 60-day delay was announced, so it should come up for action in a couple of weeks.

The Buick version of a V-8 is understood to be a valve-in-head design, while the Pontiac and Olds types are conventional L-head. Should the power plants be perfected for 1949 or 1950 models, a large program of foundry equipment and machine tool buying likely would be in store. The machine tool people already have had some tentative feelers on equipment, but this has not passed the conversational stage as yet. One deterring factor is the extreme cost of all types of new tooling.

Expansion and re-equipment of the Pontiac foundry, for example, originally

(*Concluded on page* 120)

HIGH HONOR

TO BE PRIVILEGED to serve many companies, known nationally for leadership in their fields, we regard as a high honor. To be favored by their continued business is a gratification. Here is a partial list illustrating our contacts of character:

American Locomotive Co.
American Seating Co.
Apex Electrical Mfg. Co.
Beaver Falls Steel Co.
Bucyrus Erie Co.
Cadillac Motor Car Division of General Motors Corp.
Campbell, Wyant & Cannon
Crucible Steel Castings Co.
Elyria Foundry Division, Industrial Brown Hoist
Fairbanks, Morse & Co.
Ferro Machine & Foundry Co.
Golden Foundry Co.
Kennedy Corp.
Key Co.
Lectromelt Steel Casting Co.
Light Alloys Co.
McConway & Torley Corp.
Minneapolis Electric Steel Casting Co.
F. E. Myers & Bros. Co.
National Radiator Co.
National Supply Co.
National Tube Co.
Ohio Steel Foundry Co.
Oregon Steel Foundry Co.
Otis Elevator Co.
Pacific Car & Foundry Co.
Pelton Steel Co.
Pettibone Mulliken
Republic Steel Corp.
Roots Connersville Blower
Roseman Structural Iron Works
Sorel Industries Ltd.
Standard Alloy Co.
Standard Foundry Co.
Symington Gould Corp.
Walker Machine & Foundry Co.

You are invited to contact Conover when planning to build a new foundry, or rebuild an old foundry. Let us advise on methods of decreasing costs and of increasing production.

CONOVER ENGINEERING CO.

O. D. CONOVER, *Consulting Engineer*

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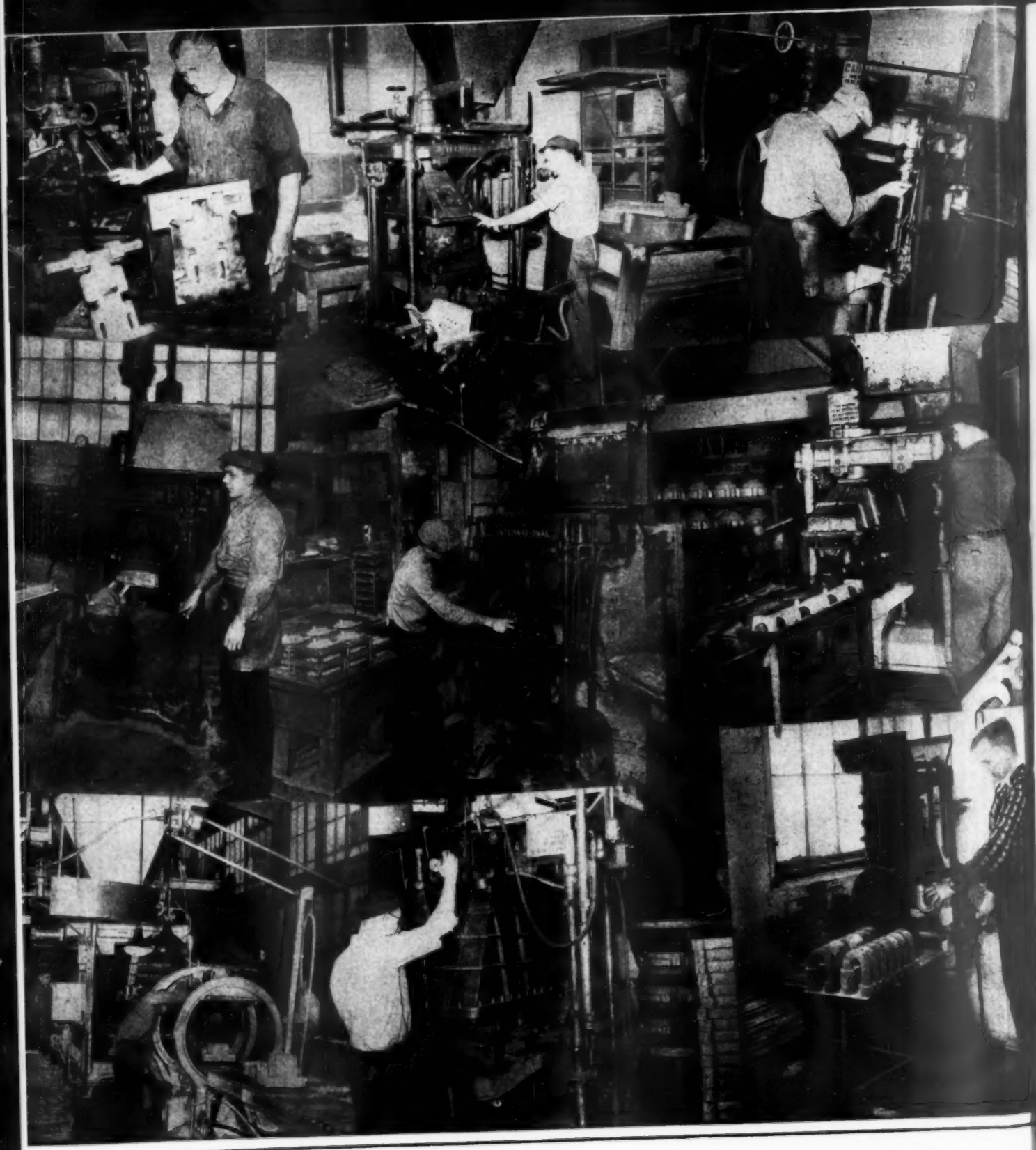
Sand Blowers by

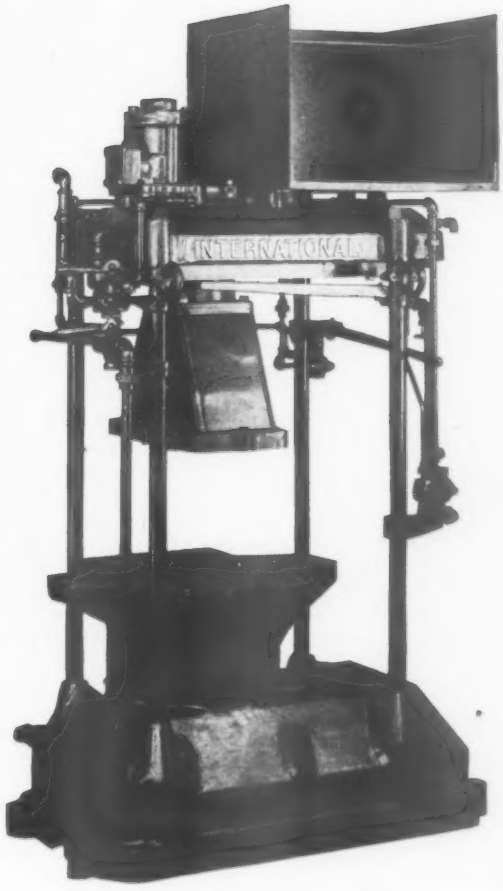


INTERNATIONAL MOLDING

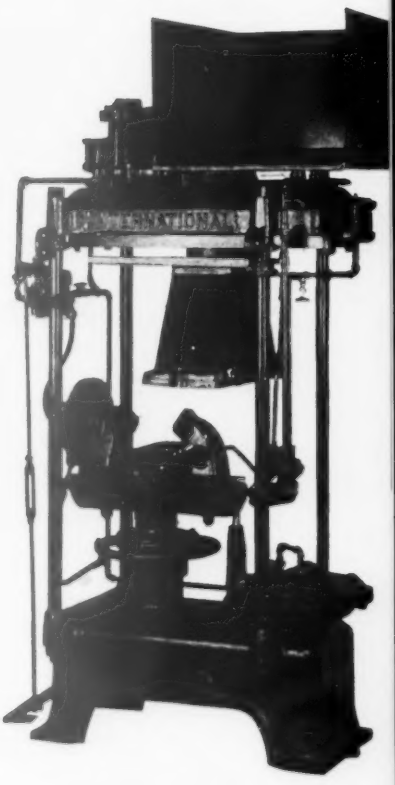
LA GRANGE PARK,

INTERNATIONAL

Type SB 13 — Sand Blower, adapted especially for horizontally split boxes of medium size, but larger than can be handled by the SB 11 machine. May be had with the roll-out feature for ease in handling large core boxes. (Side clamps and vibratorially agitated hopper available as extra features.)



Type SB 11 — For medium sized cores with air clamp and draw feature. (Side clamps, rollers, vibratorially agitated hopper are all available as extra features.



Type SB 10—Sand Blower, adapted especially for medium size split boxes. Side clamps are standard equipment. (Vibratorially agitated hopper is available as an extra feature.)

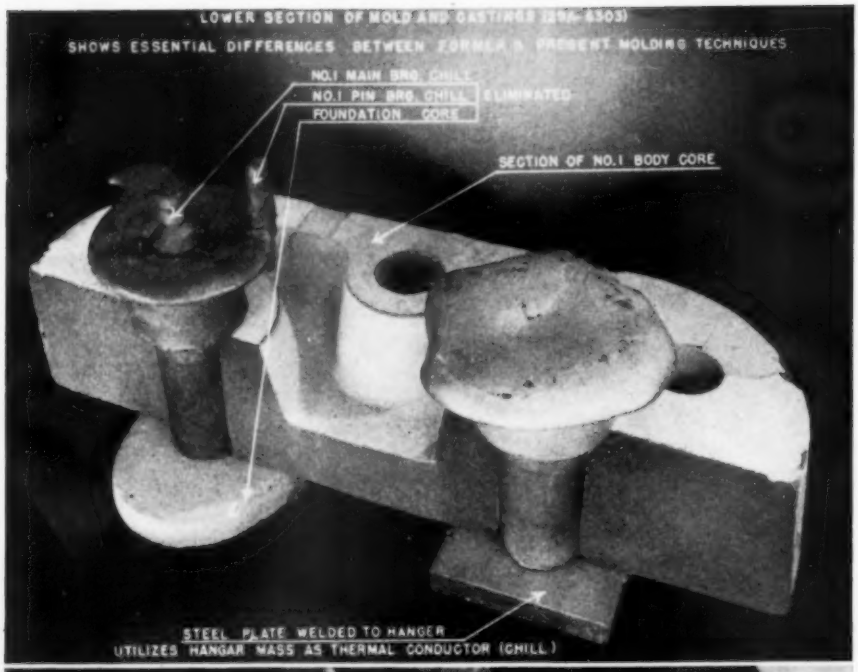
A COMPLETE LINE OF SAND BLOWERS

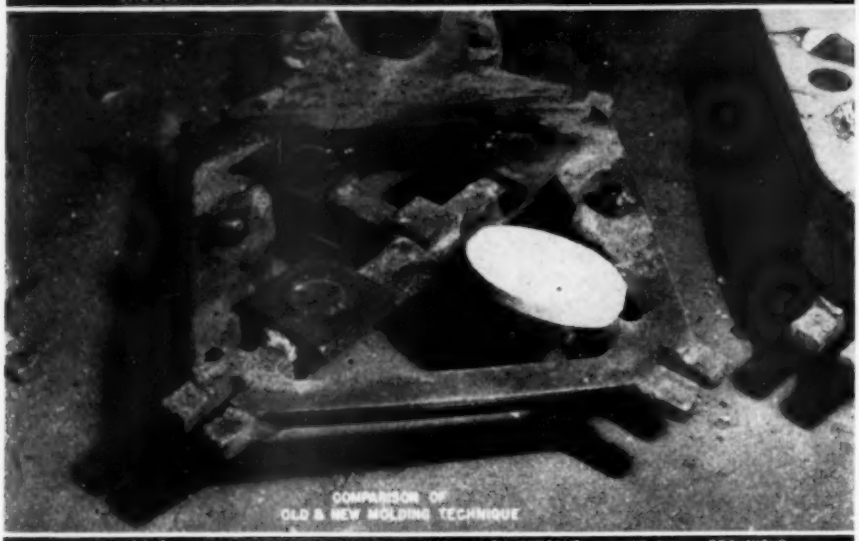
The possibilities in the use of INTERNATIONAL SAND BLOWERS in the Core Room and Foundry are very extensive and with the proper pattern set-up and the International "know-how" many industry problems become greatly simplified.

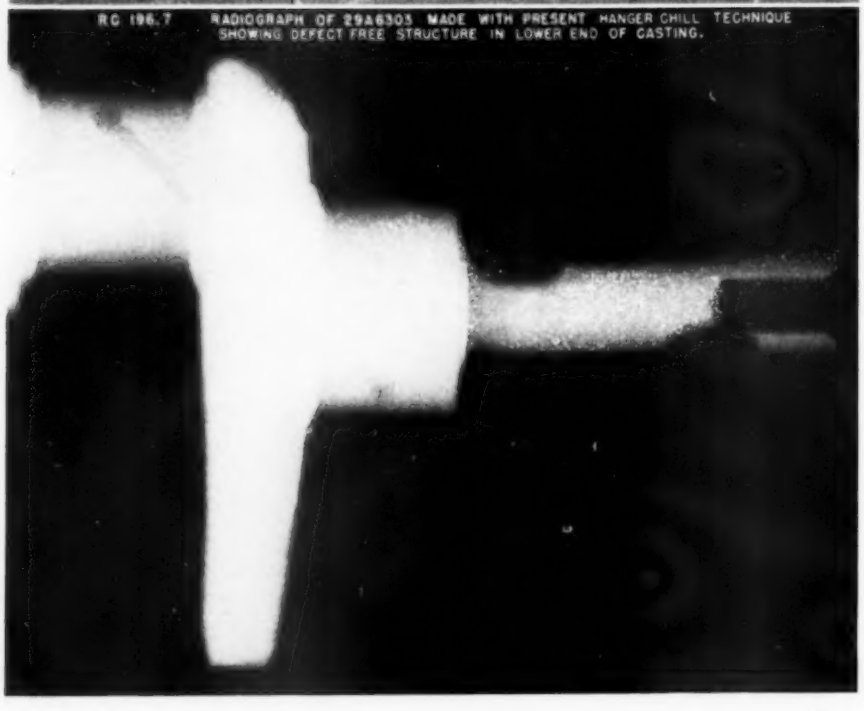
WRITE FOR ILLUSTRATED BROCHURE ON INTERNATIONAL SAND BLOWERS

MACHINE COMPANY

SUBURB OF CHICAGO **ILLINOIS**


LOWER SECTION OF MOLD AND CASTING (29A-6303)
SHOWS ESSENTIAL DIFFERENCES BETWEEN FORMER & PRESENT MOLDING TECHNIQUES
NO.1 MAIN BRG. CHILL
NO.1 PIN BRG. CHILL ELIMINATED
FOUNDATION CORE
SECTION OF NO.1 BODY CORE
STEEL PLATE WELDED TO HANGER
UTILIZES HANGAR MASS AS THERMAL CONDUCTOR (CHILL)




RC 196.7 RADIOGRAPH OF 29A6303 MADE WITH PRESENT HANGER CHILL TECHNIQUE
SHOWING DEFECT FREE STRUCTURE IN LOWER END OF CASTING.

Illustrating the new crankshaft molding technique at Ford Motor Co.'s gray iron production foundry. Top panel shows the old method (left) and present practice (right)

(*Concluded from page* 116)

slated to have been completed months ago, is still a long way from realization, and doubts are heard that it will be carried through as planned a couple of years back.

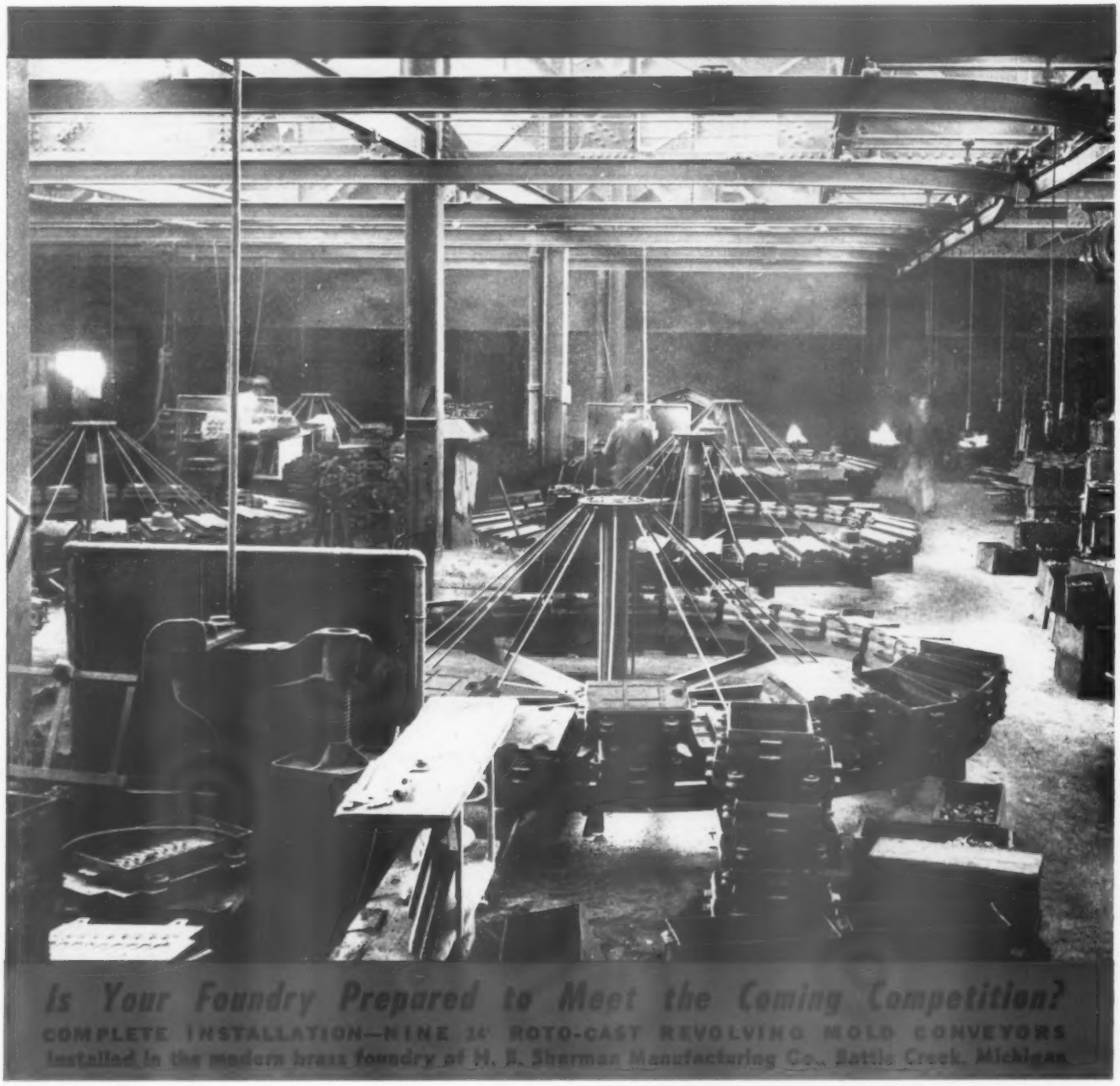
* * *

REVOCATION of government controls on pig iron have improved the supply situation in respect to that material to the extent that complaints are fewer. However, with many melters it is still a touch-and-go proposition. The same applies to coke, although most of the complaints heard on this material have to do with quality rather than supply. A break in scrap prices last month was a welcome turn and may be the forerunner of considerable improvement in all foundry raw materials.

General Motors' experience with Mexican pig iron was not a happy one. The purchase, made several months ago, covered about 3000 tons. When the first shipments arrived, inspection revealed the pigs to be unusually small in comparison with U. S. iron, and each pig appeared to have an outer layer of about ½-in. of slag or cinder. The only way it could be used was as an admixture in extremely small quantities. On top of that the long haul involved in getting the material to Saginaw made the cost of the material prohibitive, so all in all the venture was a near total loss. Better results are reported from iron brought in from the Geneva furnace. Quality was good, although the freight premium was something like $15 per ton.

* * *

NEW Kirksite foundries are being built in a number of locations by General Motors Overseas Operations to supply cast tools and dies for automotive stampings. The corporation is pioneering zinc alloy tooling in overseas work, finding it possible to effect important reductions in tooling costs over conventional cast iron and steel, particularly where short runs are involved. Metal alloy is melted in crucible-type furnaces and is poured in sand molds at around 700 F. When dies have served their purpose they may readily be remelted for further casting, so net scrap loss is only about 10 per cent. Foundries have been built in Britain and in Mexico, and more are planned for Australia and other areas where GM Overseas has manufacturing and assembly plants.



Is Your Foundry Prepared to Meet the Coming Competition?

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ROTO-CAST Revolving Mold Conveyors are lowering costs . . . increasing production . . . providing safer, more healthful working conditions in foundries throughout the country . . . and at moderate installation cost. Complete information will be sent upon request.

ROTO-CAST *Foundry Equipment, Inc.*

COLDWATER, MICHIGAN, U. S. A.

WRITE FOR FOLDER "F" FOR FURTHER DETAILS

MECHANIZE YOUR MOLDING FLOOR AT LOW COST

GRAY IRON COST GROUPS

Established on Pacific Coast

SUCCESSFUL organizational meetings of gray iron foundrymen interested in forming local cost groups were held recently in Seattle, Wash. and Oakland, Calif., under sponsorship of the cost committee of the Gray Iron Founders' Society Inc. A similar meeting was scheduled for Los Angeles, April 11.

Formation of the Northwest Cost Group was accomplished at a meeting in Seattle, March 25, arranged through a steering committee headed by Chairman J. L. Long Jr., Atlas Foundry & Machine Co., Tacoma, Wash., and R. E. Kucher, Olympic Foundry Co., Seattle, Wash., and including Barton Sather, Hagedorn Foundry Co., Everett, Wash.; Charles Anderson, Eagle Brass Foundry Co., Seattle, and E. Huffschmidt, Western Foundry Co., Portland, Oreg. This meeting was attended by 45 persons representing 17 foundries of the district and resulted in 16 foundries joining the group, including seven from Seattle, four from Portland, three from Everett and two from Tacoma.

The new Northern California cost group starts with a nucleus of ten member foundries, following the meeting at Oakland, April 4. S. D. Russell, Phoenix Iron Works, Oakland, and national director of both the American Foundrymen's Association and the Gray Iron Founders' Society, served as chairman of the steering committee in the organization of this group. Other members of the committee are Alan Axford, Mission Foundry & Stove Works, San Francisco; Paul Jordan, Vulcan Foundry Co., Oakland; Earl Paltenghi, Macauley Foundry Co., Berkeley, Calif.; Ralph Noah, San Francisco Foundry Co., San Francisco, and W. E. Butts and T. Gartrell, General Metals Corp., Oakland.

Extension of gray iron cost group activities to the Pacific coast is largely the result of the time and energy devoted to this work by A. E. Hageboeck, Frank Foundries Corp., Moline, Ill., and the cost committee of the Gray Iron Founders' Society of which he is chairman. Previously 12 other cost groups had been organized in the East and Middle West, the oldest of these dating its establishment to 21 years ago. These 12 groups are located in New England, eastern Pennsylvania, western New York, Cincinnati, Michigan, Pittsburgh, northern Indiana, northern Ohio, St. Louis, Iowa, Wisconsin and Chicago.

Speaking before the meetings at Seattle and Oakland, Mr. Hageboeck explained that the rapid rise in popularity of the local cost group plan the last year and a half reflects the fact foundrymen are more cost-minded than ever before, and they realize the time is not far distant when sound costs will be indispensable to continued business success. Mr. Hageboeck outlined briefly the history of the local cost group plan which dates back to 1926 when a group of Iowa foundrymen formed the Iowa Cost Group for the purpose of studying costs on a comparative quarterly basis. At that time a cost consultant was engaged to collect actual cost figures at the end of each quarter and prepare a "blueprint" showing a breakdown of departmental costs.

Mr. Hageboeck pointed out that the system is a practical and proven method of establishing sound costing by group action and the only known method for reaching the small foundry which has little or no cost information. He emphasized, however, that the method has been found valuable to both jobbing and captive foundries regardless of whether or not the companies already were operating with good cost records; further that existing cost systems are not disturbed and no additional clerical help is required for participation in the plan.

Cost data compiled by the society's consultant each quarter from a questionnaire returned by the various companies are assembled on a uniform basis to show each foundry's unit costs, overhead ratios, man-hour statistics and other cost. This compilation, prepared in blueprint form, permits a quick comparison between the different foundries in the group—but without disclosing the identities of the various companies.

R. W. Paulsen, cost consultant of the Gray Iron Founders' Society, who has had about 20 years' practical experience in figuring foundry costs, directs the western cost groups and was present at the Seattle and Oakland meetings to explain in more detail the operation of the group system. Foundrymen present were requested to estimate the cost on a simple job and Mr. Paulsen then compared these figures with the "blueprint" averages of one of the existing cost groups. This comparison showed a wide variation in estimated costs by different foundries. He then explained how to arrive at the correct cost figures and discussed the "blueprint" method used for comparison.

At the Oakland meeting S. D. Russell, steering committee chairman, described efforts in the past to initiate a cost program on the West coast, and urged support of local foundries in order that the new Northern California Cost Group might duplicate the success experienced by the eastern groups.

Members of the steering committee for the Southern California Cost Group include: Robert Gregg, Reliance Regulator Corp., Alhambra; Frank E. Dayton, Dayton Foundry Inc., Hollydale; Dave Campbell and J. E. l'Anson, Kinney Iron Works, Vernon; Martin Madsen, Madsen Iron Works, Huntington Park; Earl Anderson, Enterprise Iron Works, Los Angeles, and Earl Grover, Apex Steel Corp., Los Angeles.

J. L. LONG JR.

R. E. KUCHER

S. D. RUSSSELL

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MADE WITH VANCORAM FERRO VANADIUM

The high quality of Vancoram Ferro Vanadium, consistent from lot to lot, assures the steelmaker closer control during production and a finished product of unexcelled microstructure and physical properties. The alloy is produced in the following grades to meet the requirements of various products and manufacturing technics:

	Typical Composition
GRADE "A" *(Open Hearth)*	Vanadium . . . 35-40% Silicon . . . . max. 12% Carbon . . max. 3.50%
GRADE "B" *(Crucible)*	Vanadium . . . 35-45% Silicon . . . max. 3.50% Carbon . . max. 0.50%
GRADE "C" *(Primos)*	Vanadium . . . 35-45% Silicon . . . max. 1.25% Carbon . . max. 0.20%
HIGH V GRADES	Vanadium . . . 50-55% 60-65% 70-80% Silicon . . . . . Low Carbon . . . . . Low

Large stocks are carried of all grades of alloys, and they can be supplied in any of the standard lump, crushed, or mesh sizes.

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WISCONSIN CONFERENCE
Technical Discussions

This concludes reports on technical papers presented at the tenth annual Regional Foundry Conference of the Wisconsin Chapter, AFA, and the University of Wisconsin. Other conference papers were discussed in the April issue

By EDWIN BREMER, WILLIAM G. GUDE, ERLE F. ROSS and GEORGE A. POPE
The Foundry

AT THE opening session on steel practice, Howard Taylor, Massachusetts Institute of Technology, Cambridge, Mass., discussed "Developments in Gating and Risering." S. E. Muller, Falk Corp., was chairman, and Norman Koch, Grede Foundries Inc., co-chairman. Mr. Taylor emphasized the importance of directional solidification in the making of sound castings, pointing out that although the theory has long been recognized, some new tools have been developed which make the practical attainment of proper temperature gradients possible.

For example, centerline shrinkage cannot be eliminated from long, uniform sections up to about 2 or 2½ in. in thickness using conventional open risers, regardless of the method of gating unless padding or chilling is used. This results from adverse temperature gradients or, in the best conditions normally attainable, uniform temperature gradients. Side risers often give better results because of the better control over the flowing metal and the more favorable temperature distribution obtained. Even if castings are gated directly into the open risers, as is done with blind risers, the same favorable conditions would not result because of the turbulent action of the metal spilling downward into the mold. In order to correct unfavorable temperature distribution risers can either be "insulated" or an exothermic material used as a "pipe-eliminator," or both expedients can be used if desired. Yields as high as 80-95 per cent can be realized and sounder castings made.

To date an excellent insulator has been found for nonferrous metals in the form of metal casting plaster, a modified form of gypsum.

No suitable insulator has been found for ferrous castings. Gypsum cannot be used because of the reaction of sulphur with iron. Exothermic powders are available, however, which accomplish the same purpose by developing heat as high as 4000 F in the riser, at the same time depositing metal of the same compositions as the castings.

At the second session on steel castings, J. Richard Adams, Crucible Steel Casting Co., Lansdowne, Pa., was the principal speaker, with Harold Zibell, Crucible Steel Co., Milwaukee, as chairman. Mr. Adams' talk centered on the desirability of eliminating vents in molds which, he stated, serve no good purpose so long as sand permeability is over 40. Vent wires are one of the chief sources of dirt in molds, he claimed. They also result in higher cleaning time on the castings. Mr. Adams cited savings of $6 to $10 per ton on jolt squeeze and slip flask work by foundries which have eliminated venting.

Shot and grit for metal blasting was discussed in considerable detail at the third steel session by James T. Gow, Battelle Memorial Institute, Columbus, O. The blast cleaning and peening processes were discussed briefly from the standpoint of methods of conducting the processes and mainly in regards to the physical and mechanical properties of commercially available blasting media. Shot and grit used for casting cleaning consist mainly of chilled iron, malleable chilled iron and special heat treated grade. Chilled iron has a composition of 3.10 to 3.60 per cent C, 0.30 to 0.50 per cent Mn, 1 to 2 per cent Si, 0.1 to 0.5 per cent P, 0.07 to 0.17 per cent S.

The speaker described various methods of testing conducted at Battelle for determining physical properties of shot and grit. The chilled iron grade has a brinell hardness of 720 to 750, while the plain malleable rating is 150 to 200 and that of the special malleable 350 to 425. These are averages. Hardness of the special grade can be varied between 230 and 650 brinell. Other properties discussed were compressive strength and impact toughness. Mr. Gow pointed out that the selection of a blast cleaning media as to size, form, hardness, and rate of breakdown should be determined from the standpoint of work to be cleaned, the production desired, and the type of finish required.

In concluding this session, M. J. Kolthoff, Stewart Instrument Co., Chicago, described his company's equipment for the comparative testing of grinding wheels. This instrument, known as the P-T-E analyzer, is attached to a grinder and records the electrical consumption and time involved in removing a certain amount of metal in the grinding operation. Calculation of amount of wheel weight removed in grinding, the amount of metal removed, electrical consumption and other costs including

(*Continued on page* 130)

Scenes at Wisconsin Regional Foundry Conference. Photos by John Bing, A. P. Green Fire Brick Co., Milwaukee

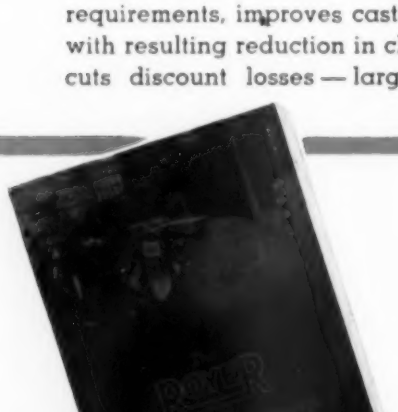
The Proof of The Royer Is in the Using

The Royer Model NC-4 Sand Separator and Blender in the above photograph prepares 12 to 15 tons of sand per hour in this large Chicago foundry — over 7500 such installations are reducing foundry costs and improving casting quality. The thousands of foundries using from 1 to 26 Royers — and the repeat orders from these same foundries—are convincing proof of its effective, efficient handling of all sand conditioning problems.

Open, velvety-textured, uniform Royer conditioned sand reduces facing and new sand requirements, improves casting surface quality with resulting reduction in cleaning room costs, cuts discount losses — large production and trouble-free, positive operation reduces preparation costs.

Sand is fed to wide, low hopper and falls on rapidly-moving, endless combing belt on which are mounted staggered, heat-treated, chrome molybdenum sprigs or teeth. Belt, traveling upward at 45 degrees, combs sand into granular form, thoroughly blends and mixes, and discharges by centrifugal force at upper end. Scrap and other sand contamination, held back by retarding sweep at top, gravitates to lower end for easy discharge by tripping retaining plate.

Simple, rugged, welded construction; large dust-proof, anti-friction bearings assure long, trouble-free service—hundreds of Royers still in operation after 10 and 15 years daily use.

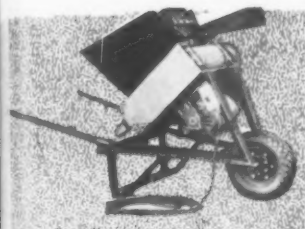


Send for Bulletin Number 744

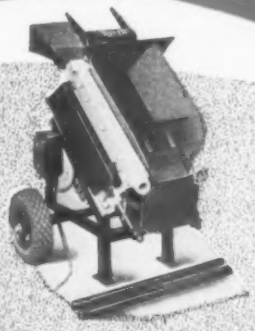
Find out about the Royer method of low-cost, top-quality sand preparation—send for this free bulletin giving complete details of construction, operation, and existing installations.

THE ROYER

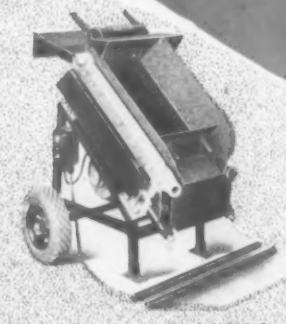
THE ROYER PARADE



The Royer Junior
4 to 7 tons per hour



Model NB-2
7 to 9½ tons
per hour



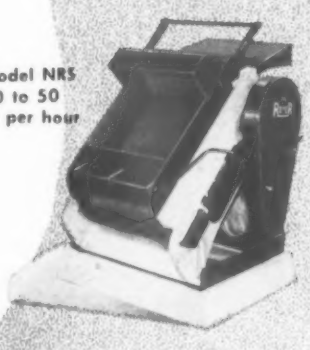
Model NC-2
12 to 15 tons
per hour

Model NB-4
7 to 9½
tons per hour

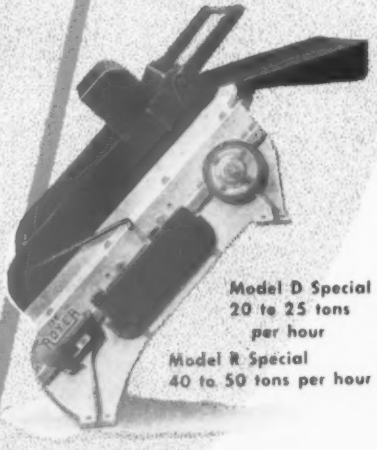
Model
NC-4
12 to 15
tons per
hour

Model NDP
20 to 25 tons
per hour

Model NDS
20 to 25
tons per hour



Model NRS
40 to 50
ons per hour



Model D Special
20 to 25 tons
per hour

Model R Special
40 to 50 tons per hour

Royer Sand Separator and Blender installations reduce costs and discount losses for greater foundry profits—the Royer removes refuse, combs grain from grain, breaks up lumps and clay balls, blends new and old sand, distributes moisture evenly, increases permeability 10 to 20 points, double aerates. There's a model to meet every requirement for high-speed, low-cost production of ideally conditioned sand. Capacities available from 4 to 50 tons per hour in regular self-powered portable or stationary models. Special stationary models "D" and "R" produce from 20 to 50 tons per hour taking power from conveyor head or other available drive shaft. Models "NDC" and "RC" combine Royer Scrap Remover and Sand Separator and Blender to provide complete sand conditioning unit for large jobbing foundries. Send for bulletin 744.

Model RC Combination
40 to 50 tons per hour

Model NDC Combination
20 to 25 tons per hour

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.
KINGSTON, PENNSYLVANIA

MAN-TO-MAN
on the Molder's Bench

"The Benefit of a Doubt"

By RALPH L. LEE

I EITHER read or heard it said that the late Will Rogers once remarked to a friend, "Johnny, I have never really *KNOWN* a person I did not like." This saying of Will's has been haunting me ever since and it seems to me more frequently here lately, the more I think about it the more firmly I am convinced that much of our labor relations difficulty would evaporate if the people who work together in shops knew each other as well as Will Rogers knew the people he liked.

The Lord only knows there are plenty of obstacles nowadays preventing shop people from getting as well acquainted as they should for their own good. Not only this, but it seems sometimes that deliberately organized efforts are being made to prevent it. In fact, when we dig beneath the surface of the advertised issues which are supposed to be at stake in labor strife, we will find that, nine times out of ten, they are based solely on hearsay—second and third hand gossip about people who have never even met each other, let alone gotten acquainted. To my way of thinking, such malicious gossip cannot thrive among people who really know each other.

° ° °

ON THE OTHER HAND, and thank God for the exceptions, there are organizations who evidently must know and understand each other so well that they trust each other and stick together and work together in spite of all the hub-bub clashes and fireworks on the outside. If there were only one or two such organizations we might toss them overboard as quintuplets or Siamese twins. But there are getting to be more and more, so many in fact that we can't avoid the conclusion that their employee relations success has got to be due to something more than lucky breaks.

With the suspicion that this might be so I have been trying to find out all I can about these organizations who seem at least to have weathered the labor relations storms. While there can be no question that some liberties, or let us say poetic license, has been taken with the truth for the sake of interesting reading, there seems to be sufficient fire behind the smoke to make a study of these stories well worth while.

In some respects, the methods and procedures used by the leaders of these organizations vary all over the lot, but in spite of this I believe I have been able to put my finger on one thing in common to them all. As far as I can see, every one of their leaders has done his best to remove the obstacles likely to prevent them, their lieutenants and their employees from getting *personally* acquainted with each other. Not only have they tried to remove the obstacles, but they have set up this vitally important getting acquainted process as an "A, number one" must for themselves and everyone else responsible for the work and conduct of their employees.

In every case when this is honestly and actually done I have been told that the bosses discover, in spite of all the gossip to the contrary, that the vast majority of the rank and file employees would rather do the right thing than the wrong thing.

When this discovery is made and the truth of it finally sinks in, the basic approach to the employees invariably shifts from expecting the worst to expecting the best. This to my way of thinking is one of the most momentous shifts any organization can possibly make and one that is sorely needed in many shops where posted rules, time clocks, requisitions, locks, barred and chicken wired tool cribs and stock rooms advertise the fact to employees that management wouldn't trust them any farther than they can see them.

° ° °

SOME TIME AGO, a rather rugged, plain-spoken and he-man foundry owner told me very frankly that he'd been reading my "Man to Man" stuff in THE FOUNDRY with a spoonful of salt and with his fingers crossed. A while back, he went on, he'd been having one hell of a lot of trouble with cold iron. So he had been giving those responsible one thorough going over, but with little or no results. Willing to try anything, as a last resort he retraced his steps and without even mentioning cold iron he complimented those involved for some good jobs they had done in the past which he'd never gotten around to thanking them for. "Doc," he said, "the iron got hot."

All over Detroit and in most of our larger cities will be found HELP YOURSELF newspaper boxes with slots to put your money in. I have checked the newspaper officials and find that they usually collect more money from these boxes than there should have been in them.

While I wouldn't go so far as to suggest that all our guards, locks and time clocks should be done away with, it might pay to *camouflage* them with signs of trust. Be that as it may, I'm convinced that if we take the trouble to get personally acquainted with our people, we're bound to find that the vast majority of them can be trusted. When we find that out and begin dealing with them on that basis, a lot of our so-called labor relations difficulties are going to evaporate into thin air. As far as I'm concerned this isn't just theory, it's a proven, money-making fact.

MODERN PRACTICES IN FOUNDRIES PAY DIVIDENDS!

IT'S BACK TO WORK!

★ The convention is over! You're back on the job . . . fortified with a knowledge of new products, new procedure, new developments gained from convention contacts and discussions. You've heard about how to make better castings. Now—your concern is "what to make them with."

One answer to that is—USE QUALITY PRODUCTS. One such quality product preferred by many foundrymen for core making is CERTIFIED CORE OIL.

★ CERTIFIED CORE OIL is back to work, too. We're fortified with the knowledge gained by many years experience in making quality, high uniform core oils to help foundries make better cores. CERTIFIED engineers are ready to pass on to you the "know-how" learned from tackling—and licking—many foundry problems.

Using the RIGHT GRADE of CERTIFIED CORE OIL is considered to be a modern practice . . . and modern practices in foundries pay dividends.

★ Certified Core Oils come in three groups—(1) CERTIFIED GOLDEN, (2) CERTIFIED UNIQUE, (3) CERTIFIED RAPIDRY. Each group comes in various grades. In one of these groups and grades is the ideal oil for your shop.

Uniformity and quality, so important in core oil performance, are assured in CERTIFIED CORE OIL because of close laboratory control of production.

Here are a few other important advantages provided by CERTIFIED CORE OILS: make smooth, hard cores • work clean in boxes • results in less gas . . . less smoking • easy shake out • minimum baking time • economy.

★ ★ ★

Certified Core Oil has long been preferred by foundry-men. It provides the advantages that result in better cores at lower cost.

Call in the CERTIFIED MAN *to help recommend* the RIGHT CORE OIL FOR YOUR SHOP!

For best results a core oil should be "prescribed for the job." To get the right oil for your jobs, let the Certified man know...

- OPERATING CONDITIONS
- TYPE OF SAND USED
- TYPE OF METAL CAST

He will make the necessary tests and recommend the oil best suited for your shop practice.

CORE OILS
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Certified Core Oil Division
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(*Continued from page* 123)

labor and overhead may be used to arrive at a final figure on machine utilization of the various wheels tested.

Charles W. Briggs, research director, Steel Founders' Society of America, was the speaker at the final steel session, with Steve Lukacek, Wehr Steel Co., chairman. Mr. Briggs confined his remarks principally to the newer developments in the steel foundry industry. These included such items as the experimental use of oxygen introduction in the electric furnace. The process is said to result in a shorter melt-down time, a reduction in hydrogen and nitrogen content with a greater boil, and saving in both melting time and power consumption. The oxygen is injected through a tuyere in the door of the electric furnace.

In discussing gases in metals, Mr. Briggs said that ladle practice apparently is an important factor in reduction of hydrogen content of the metal despite a vigorous boil. Much more attention may have to be paid to ladle practice, he added. Reporting on the use of argon gas as a fluxing agent to eliminate hydrogen from metals, Mr. Briggs said that apparently no benefit results when used with low alloy and straight carbon steel. On high alloy steels indifferent success has been obtained. Some further studies on this subject are under way.

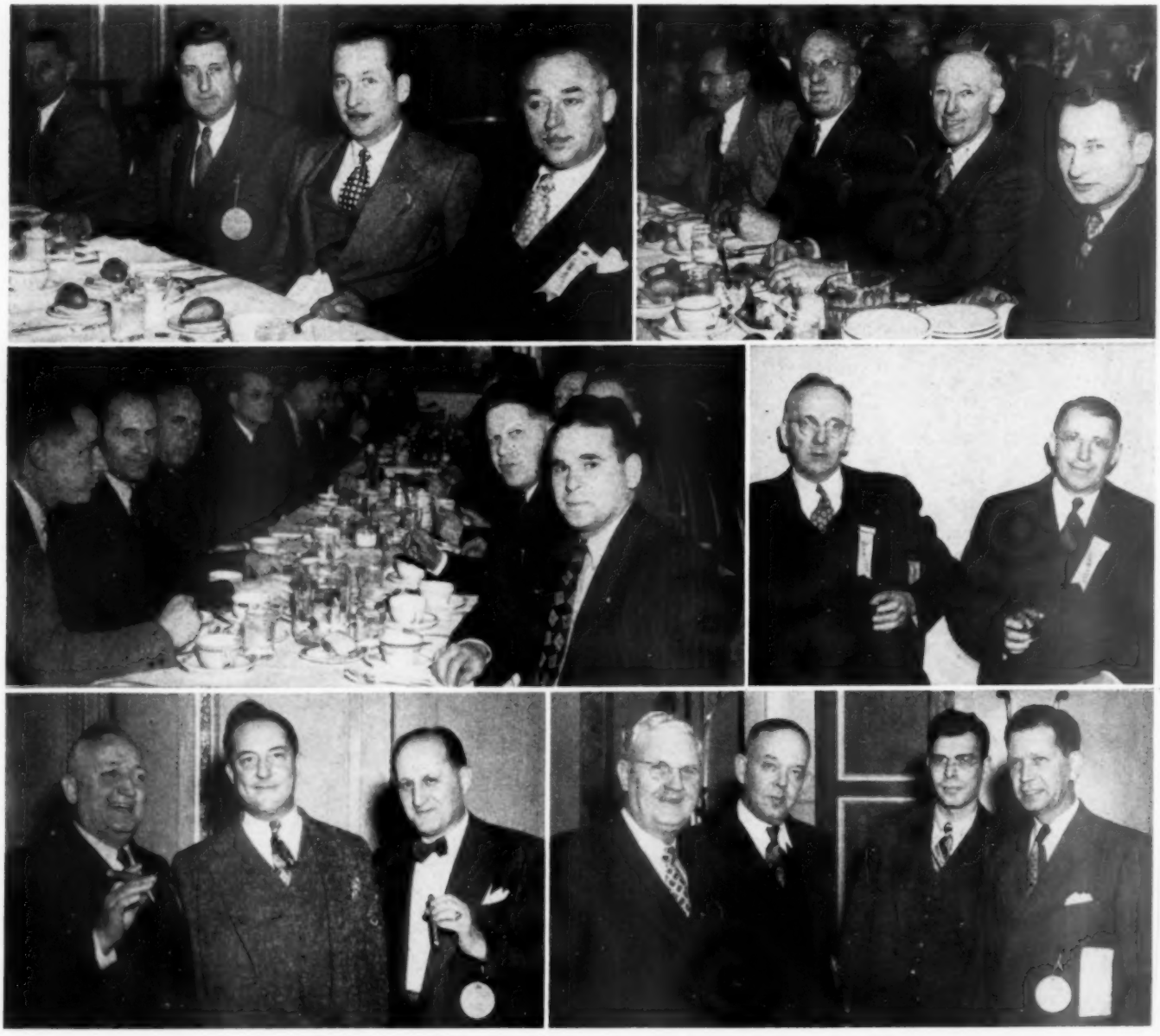
The speaker reported conflicting results on sulphur reduction and lining damage through the use of lithium. This material is used either as a metal or as an ore. He added however, that the latter might affect the furnace lining. Silenium additions to the bath change inclusions to a round rather than chain type so that the effect of high sulphur on metal properties is not serious. Sodium metasylicate also has been used as an addition to slag for sulphur reduction.

Another development reported by Mr. Briggs is that by the end of this year it is expected that nickel sinter will be available for use in electric furnaces. This nickel iron oxide will be cheaper than the electrolytic nickel. It can be added early in the heat and still permit good recovery when the furnace is tapped.

* * *

"Magnesium Pattern Equipment" was the subject discussed at the second pattern session, with Lee Cress, foreman, pattern shop, Howard Foundry Co., Chicago, as the speaker. M. C. Frankard, Delta Mfg. Co., Milwaukee, and H. R. Arneson, Spring City Pattern Works Inc., Waukesha, Wis., presided as co-chairmen.

(*Continued on page* 132)



Additional views of some of the approximately 550 foundrymen who registered for the Wisconsin conference

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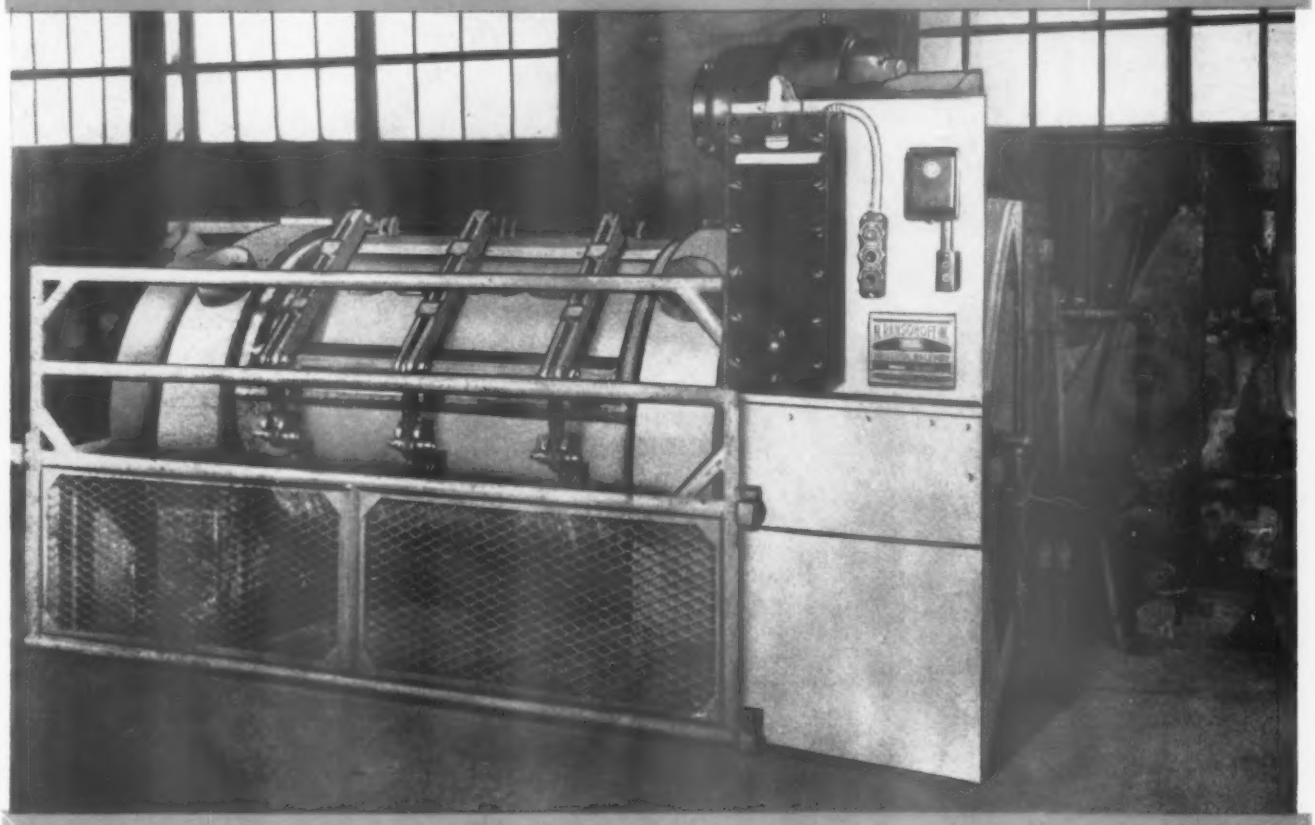

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SEND US A SAMPLE BATCH.

WE WILL RUN CLEANING TESTS AND

SUBMIT A FULL REPORT. NO OBLIGATION

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1. SAVE 30% TO 70% ON CLEANING COSTS
2. MINIMUM MILL WEAR
3. BETTER CLEANING—LARGE AND FRAGILE CASTINGS

THIS is no idle promise . . . it's being proved time and time again in foundries—large and small—from coast to coast. RANSOHOFF WET CLEANING MILLS save labor, costs, space, eliminate health hazards and do the work of *several* old-fashioned mills.

Illustrated is an actual photograph of a RANSOHOFF 42" x 60" SIDE-LOADING, SIDE-UNLOADING MILL cleaning motor and brackets. This mill replaced three old-style mills.

GENTLE...EASY...ECONOMICAL...NOT SELF-DESTRUCTIVE...NO DUST

N. RANSOHOFF, Inc.

Township Ave. & Big 4 R.R. **Cincinnati 16, Ohio**

(*Continued from page* 130)

Magnesium machines easier than aluminum—permitting deeper cuts with less power—although the hardness test shows it to have the greater hardness, stated Mr. Cress. Magnesium also shows up better in hand finishing of patterns. Where changes are necessary, new pieces can be welded on. Welding can be performed easily, although some inert gas must be used to exclude oxygen.

Present-day cost of magnesium patterns runs from 60 cents to $2 a pound, depending upon design. Ingots cost about one-third more than aluminum, but patterns weigh about one-third less, to balance off. In the case of very large coreboxes, those made of magnesium can frequently be put on and taken off machines manually, thereby saving time involved when handling by crane or hoist.

According to Mr. Cress, magnesium stands up well. He cited the case of an automobile maker who obtained 65,000 cores from one corebox. The metal satisfactorily withstands the abrasive action of sand blowing, comparing favorably with other metals, the speaker stated.

Deposit Copper Face On Pattern

The third pattern session was devoted to a discussion of copper patterns formed by the electro-deposition method. The subject was presented by A. K. Laukel, Electro-Chemical Pattern & Mfg. Co., Detroit, with A. M. Fischer, Jurack Pattern Co., and G. C. Krueger, Allis-Chalmers Mfg. Co., presiding.

In duplicating a wood master pattern in copper the former is molded in plaster, the pattern withdrawn and a copper facing then deposited electrolytically on the plaster. The duplicate hollow copper pattern that results is provided a white metal backing consisting of an antimony-copper-lead-zinc alloy. Mr. Laukel pointed out that copper patterns eliminate the double shrink master pattern stage, thereby allowing trial castings and any desired changed on the working patterns before the copper pattern duplicates are made for production.

In addressing the concluding pattern session, A. F. Pfeiffer, pattern and foundry division, Allis-Chalmers Mfg. Co., Milwaukee, stated the AFA expects to have within two years a manual on patterns which should go a long way to encourage better uniformity in design and purchase of patterns. This should assist the purchasing agent and others who now see blueprints but do not visualize the patterns.

Mr. Pfeiffer showed a number of slides of illustrations which the committee desires to incorporate in the manual. These showed what cores mean on larger jobs, sizes and type of coreboxes and flasks, method of setting cores, sizes of some patterns, etc. It is intended to make the manual loose-leaf, so that pages can be added from time to time.

Making scale models from blueprints before construction of patterns and corebox es is becoming popular, but still more of this is needed, the speaker stated. In the case of complicated patterns and coreboxes, money can well be spent to make working models to illustrate construction and assembly.

M. C. Frankard, Delta Mfg. Co., Milwaukee, and A. M. Fischer, Charles Jurack Co., Milwaukee, presided as co-chairmen at this session.

* * *

Nonferrous melting atmospheres were discussed by Herman L. Smith, Federated Metals Division, American Smelting & Refining Co., Pittsburgh, at the second nonferrous session. A. K. Higgins, Allis-Chalmers Mfg. Co., was chairman. Mr. Smith stated that gas porosity in brass and bronze castings is a most important problem which can be remedied by a better understanding of the reactions involved in melting. Products of incomplete combustion in oil or gas-fired melting units are water vapor, carbon and carbon monoxide which can enter the molten metal in those or dissociated forms and cause gas porosity. For example, hot carbon dissociates water vapor into hydrogen and carbon monoxide which can enter the melt and co-exist there until the metal is poured, when the hydrogen may react with metal oxides to form water vapor. That and the carbon monoxide may be the cause of gas porosity. Again carbon may build up in the melt and react with metal oxides formed during pouring to produce carbon monoxide causing gas porosity.

Three recommendations made by Mr. Smith include: 1—Adjust the burners on gas and oil-fired furnaces and the oxygen input in electric furnaces until the furnaces atmosphere shows no carbon monoxide, about 0.5 to 2 per cent oxygen, and as high a carbon dioxide value as possible. With induction furnaces reduce the turbulence to a minimum and add the charge to the crucible in increments rather than to use the full metal charge. 2—Maintain temperature and pouring speed constant at all times and see that all avenues of feed to the casting proper are kept full during pouring. Never vary the pouring speed. If these recommendations are followed any difficulties which may arise can be corrected by (3) a proper placement of gates, risers, chills, etc.

Third nonferrous session comprised a discussion of the subject of sand by George Anselman, Goebig Mineral Supply Co., Chicago, with Kasimir Kotowitz, Ampco Metal Inc., the chairman. Mr. Anselman detailed the properties of different types of sand mixtures and the requirements of various nonferrous casting practices.

The concluding nonferrous session was devoted to a discussion of foundry costs by James W. Wolfe, executive secretary, Non-Ferrous Founders' Society. W. W. Edens, Ampco Metal Inc., served as chairman. Mr. Wolfe pointed out that costs are important in forecasting future business by setting up standard costs, production and profits. In such budgeting or forecasting for the future, founders should consider only those factors which are true for normal operating years and not the experience of the more recent war years. By such forecasting an operator can and should decide on the work most suited to his equipment and past experience, and vary as little as possible from this decision.

In making up such a budget, closer customer relations are recommended, since at least 90 per cent of all manufacturers will also have made fairly definite manufacturing plans for the coming year. By combining these customer manufacturing forecasts, the founder can prepare his own operation from an expense and profit standpoint and from his own forecast see just where his overhead and production costs must be varied.

Explained Cost Factors

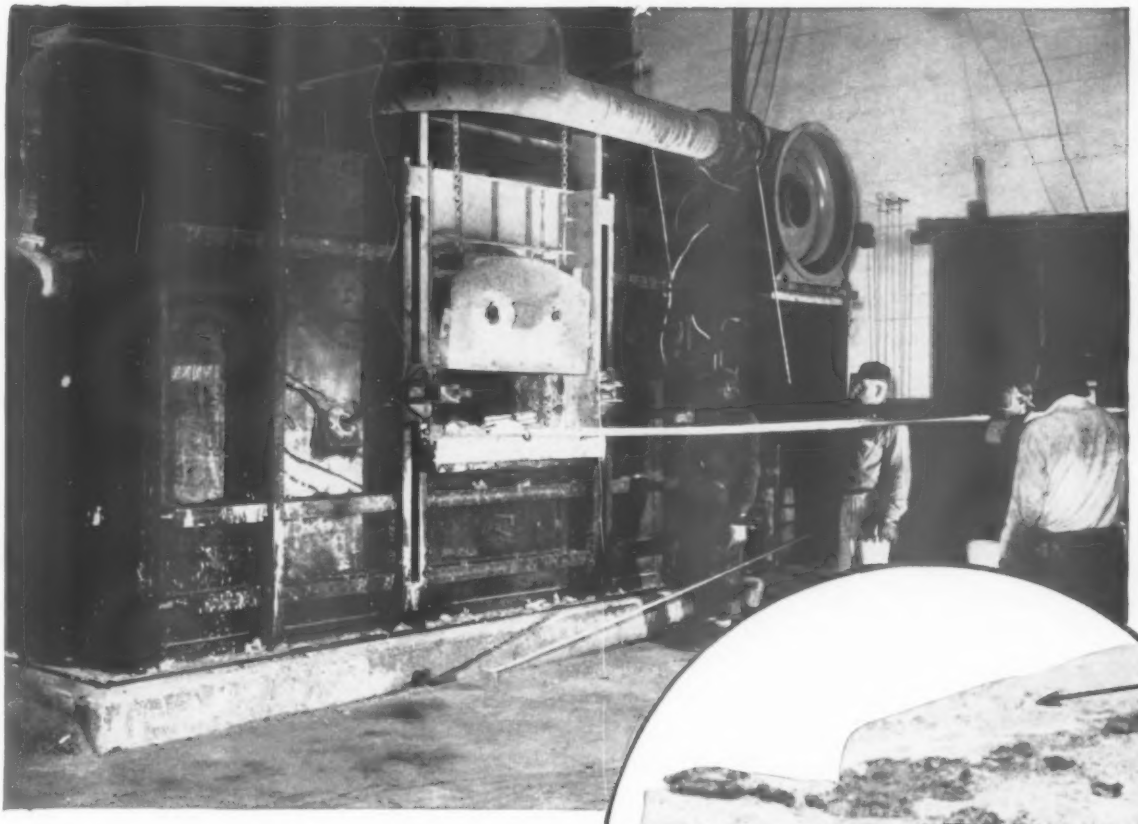
Mr. Wolfe then showed a simple break-even chart and explained the various factors governing its use. These factors included what should be normal operation in sales volume or the sales volume determined by customer future needs; poundage based upon past cost experience; fixed charges; metal costs; direct labor costs from past production experience, and variable or controllable overhead costs from records. By proper application to the chart it is then possible to forecast the point where fixed charges have been earned and profits will begin, and also the ultimate percentage of profits which can be obtained over the expenses considered.

* * *

Multiple, or stack molding, an old idea which has been revived by many foundries as a method of lowering costs and increasing production, was discussed by Lawrence D. Pridmore, International Molding Machine Co., before an interested audience at the malleable session Friday morning presided over by P. J. Anderson, International Harvester Co., Waukesha, Wis.

Mr. Pridmore dealt in turn with the particular requirements in multiple molding of flask equipment, patterns, sand, pouring and shakeout. Special flask equipment was described as a necessary

(*Continued on page* 135)



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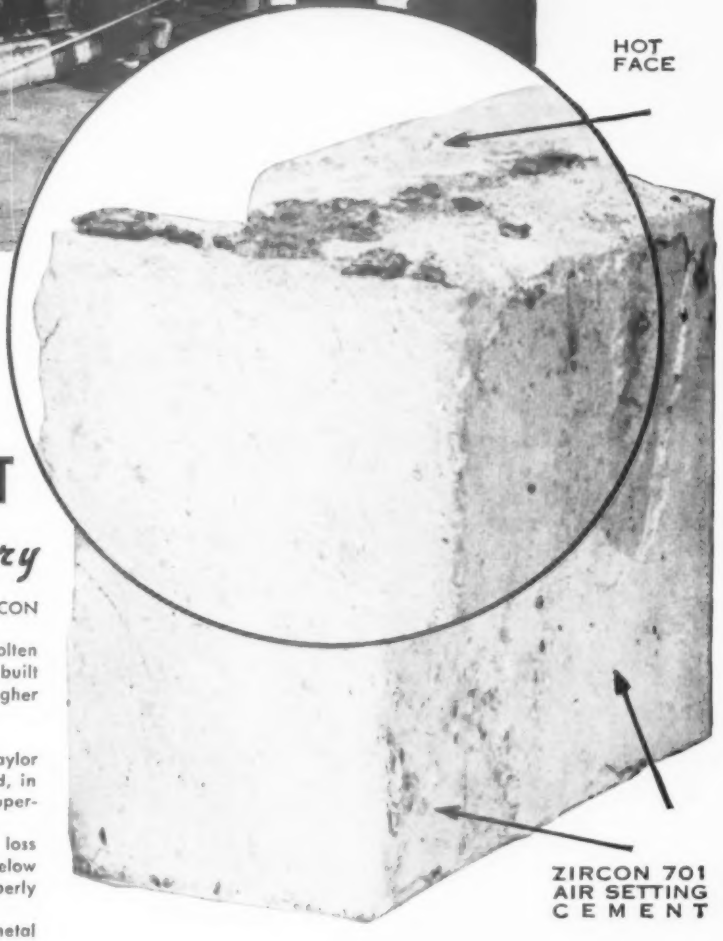

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- Lower hearth and side wall cost per ton of sound, clean metal cast.

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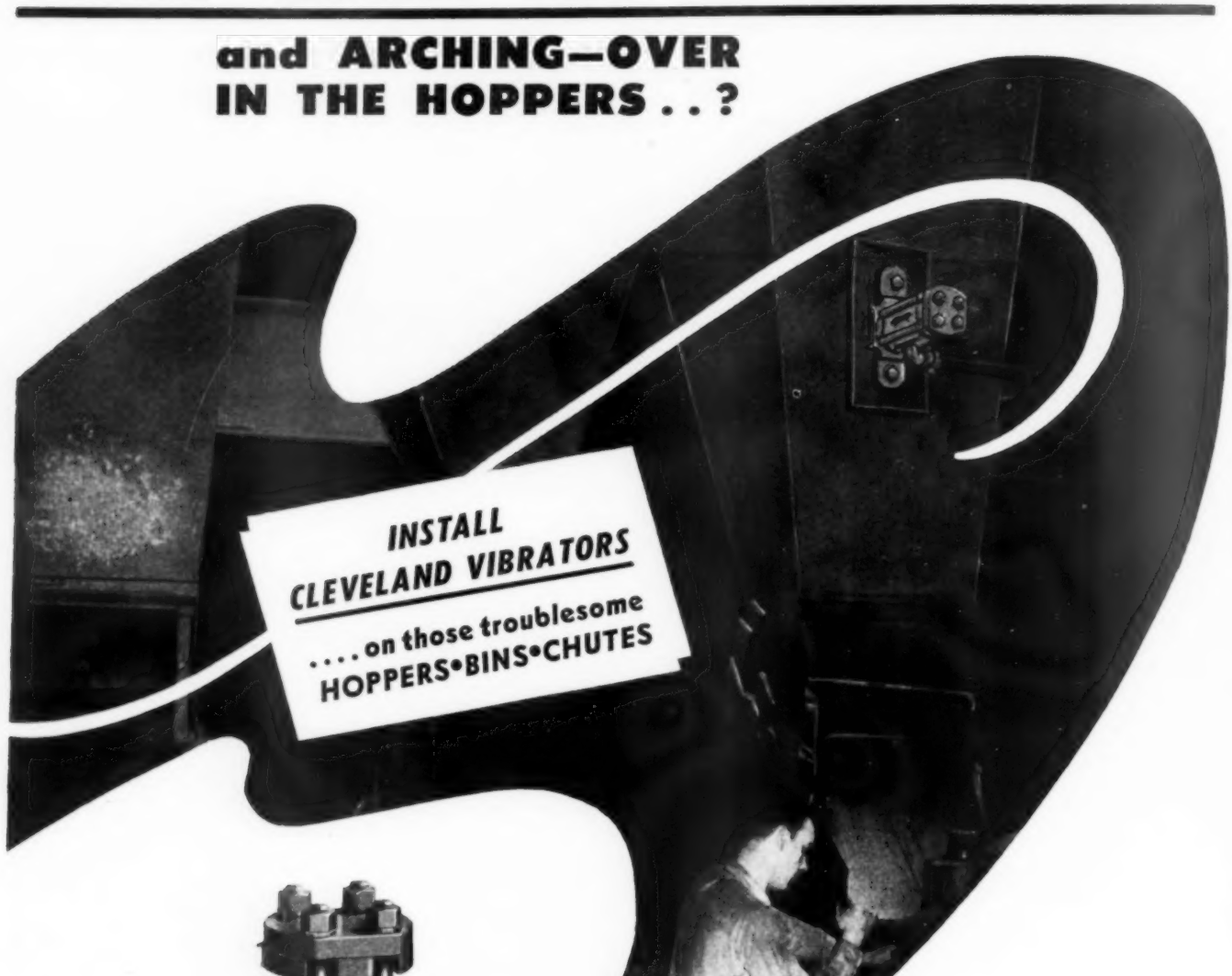
and ARCHING—OVER IN THE HOPPERS . . ?



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. . . . designed to eliminate 'arching-over' and 'plugging' . . . . and to assure a steady, continuous flow of sand from hoppers, bins and chutes . . . . engineered for continuous or intermittent service to deliver rapid, powerful, 'hammer-like' blows of greater intensity than can be expected from any other type of vibrator . . . . economical initial installation and operating cost . . . . available from stock in horizontal and vertical mountings in a wide variety of sizes . . . . recommendation as to type and size required is promptly made on receipt of information as to size and capacity of your hoppers, bins or chutes.

Complete Catalog on All Types & Sizes of Vibrators Available on Request

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(*Continued from page* 132)

aspect of stack molding. Special steel flasks, vented for relieving gas pressures, are most successful at the moment, it was stated, although aluminum flasks have been used and experiments with snap flasks are being made.

In rigging for production, the ideal situation was described as having a permanent frame fastened to the machine for cope and drag half of patterns. The speaker suggested that patterns be made so as to permit inserting them in a frame, setting a standard dimension of ½ or ⅝-in. thickness. Molding machine equipment used must be extremely accurate. The jolt, squeeze principle with draw attached is employed.

Pouring practice, it was said, called for from 5 to 12 molds in a stack, the top and bottom halves being dummy molds. Stacks are weighted and runner cups are advisable for the purpose of achieving pressure adequate to fill the top mold. Practice in pouring, it was stated, is to pour the bottom half of the stack slowly, the top half fast. Scrap losses have been held to 2 per cent where practice has been standardized.

On the subject of increased production possible with multiple molding, reference was made to an increase in output per nine-hour day of from 160 molds to 500 molds, the molder doing his own pouring in the former instance.

Addressing the fourth and concluding malleable session on "Some Factors Affecting Annealing," W. D. McMillan, chief metallurgist, implement division, International Harvester Co., Chicago, reviewed the effect of the five principal elements. P. J. Anderson of the same company, Waukesha, Wis., presided.

Silicon has the most pronounced effect on annealing time and is the element which is varied to enhance the anneal, according to the speaker. The five principal elements were grouped as the tangible factors which lend themselves to determination and hence to control by chemical methods of analysis.

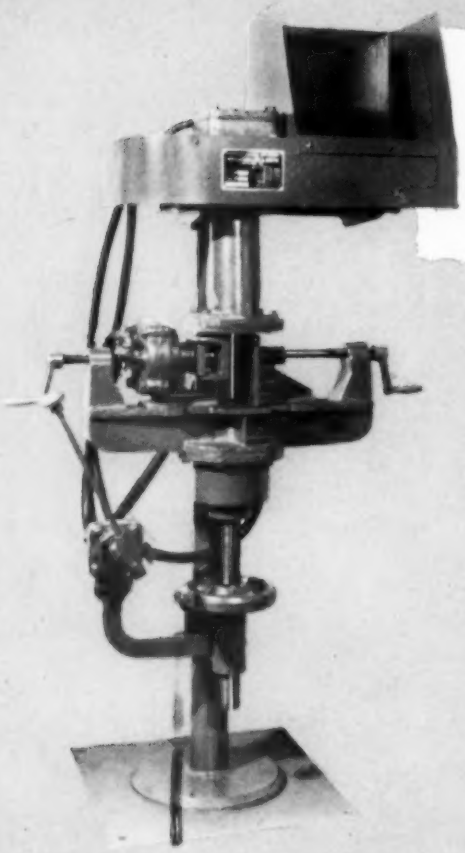
Other factors of less tangible nature were discussed, such as the decarburizing effect of moisture in the annealing furnaces atmosphere which reduces the number of graphite nodules and contributes to the formation of a pearlitic rim. Heating to a temperature of about 700 F before annealing will increase the number of graphite nodules matured in the anneal.

• • •

At the opening technical session Thursday afternoon, E. J. Wellauer, the Falk Corp., Milwaukee, presented a discussion on "Classical Interpretations of Hardenability," with Walter R. Pun-

(*Concluded on page* 143)

Wisconsin Chapter officials and conference participants at Milwaukee. Conference chairman was R. J. Anderson (second from left, bottom panel), Belle City Malleable Iron Co., Racine, Wis., president-elect of the chapter



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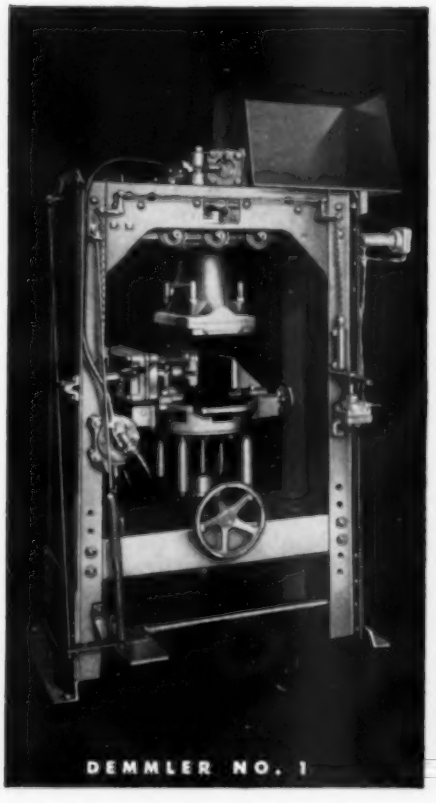

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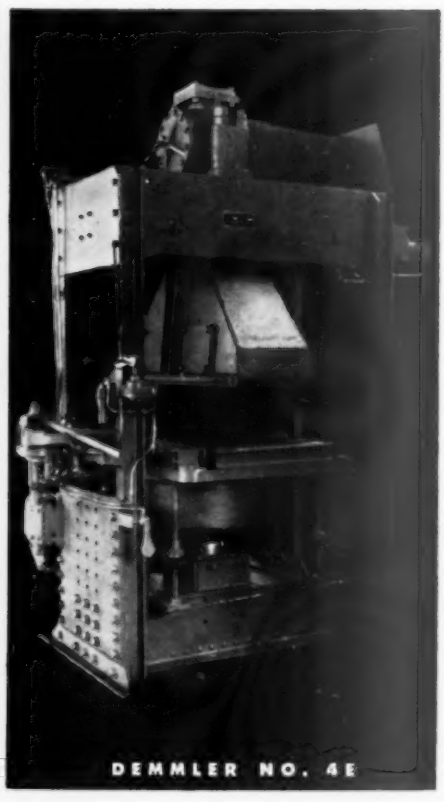

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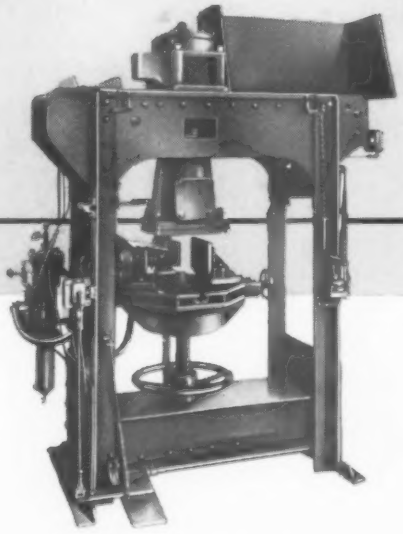

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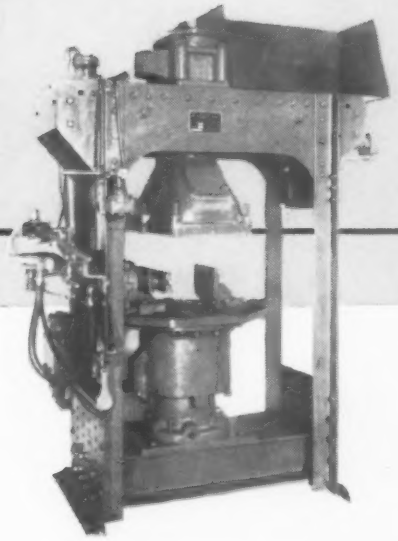

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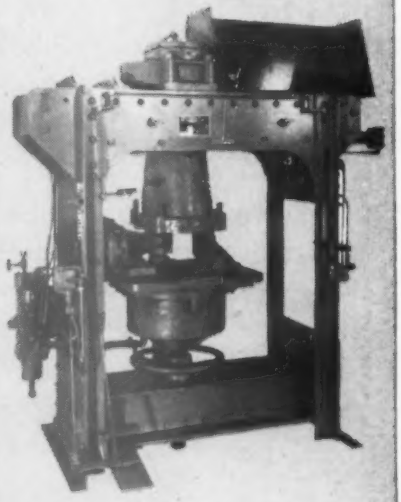

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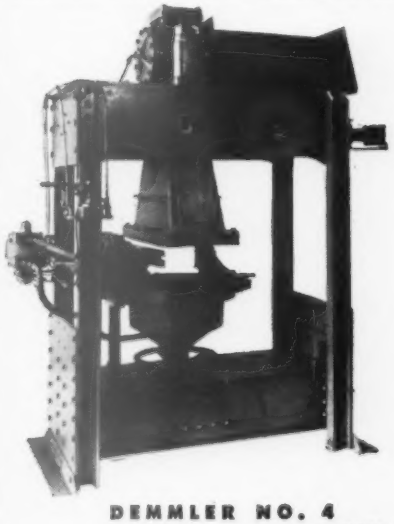

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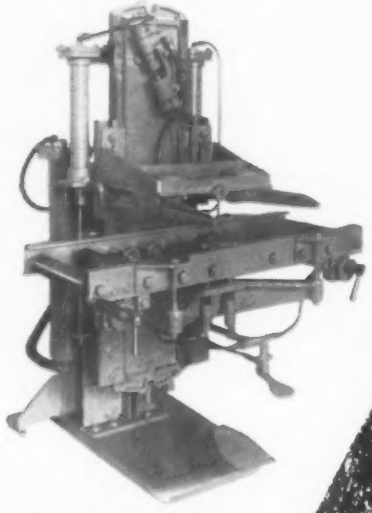

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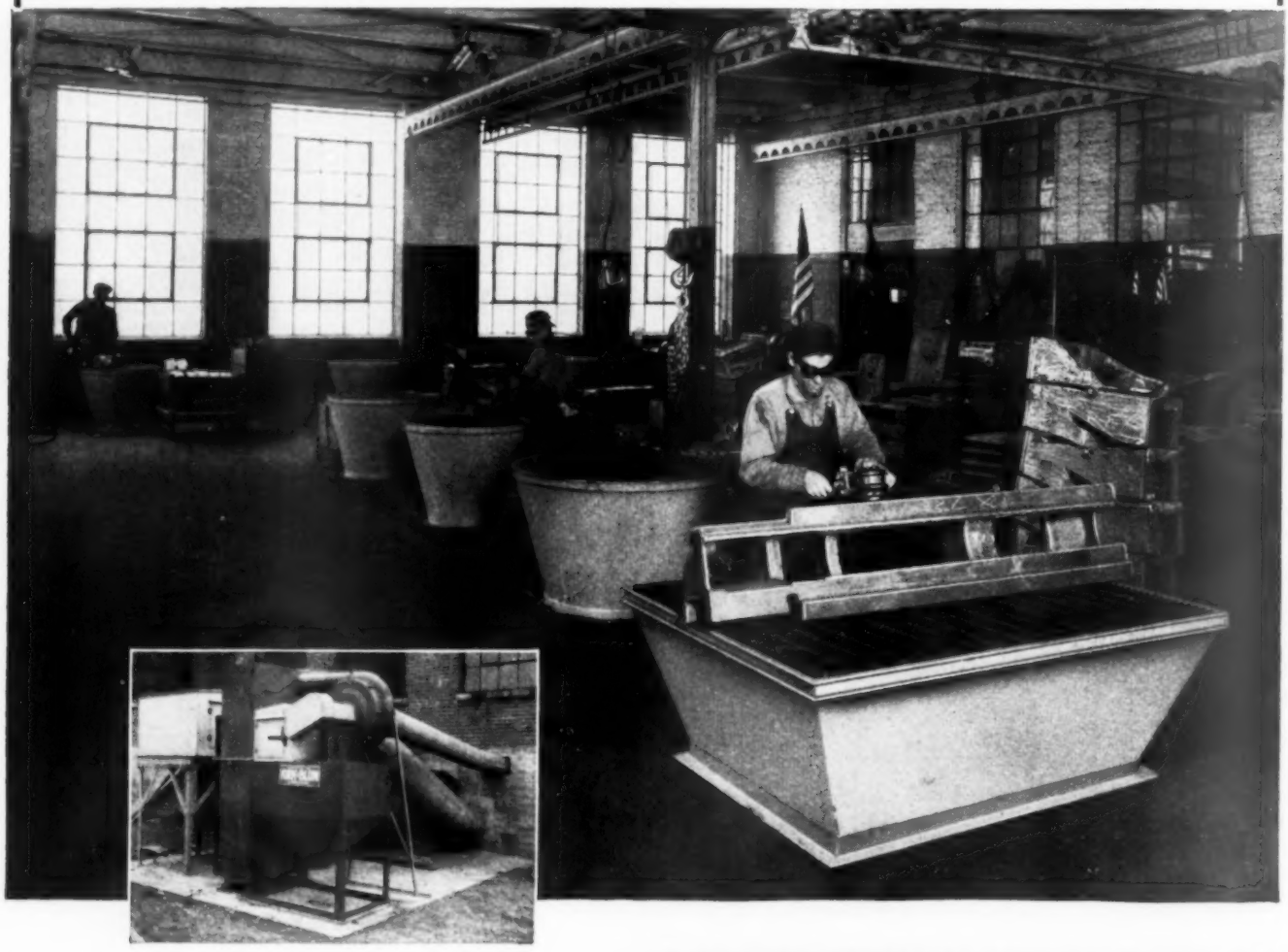

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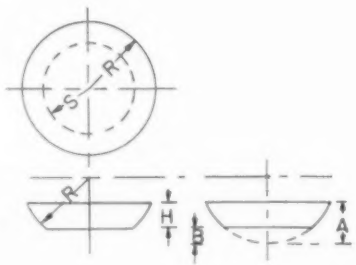
FORMULAS FOR DETERMINING THE WEIGHTS OF CASTINGS

(Concluded from April)



To find the weight of a spherical segment of two bases, from the radius of the sphere multiplied by the difference between the squares of the distances from the bases to the pole, by the constant K, subtract the difference between the cubes of the distances from the bases to the pole multiplied by the constant C, obtained from Table XIX, or to the sum of the squares of the radii of the bases multiplied by the height by the value of m, add the height cubed multiplied by the value of c.

$$W=(A^2-B^2)RK-(A^3-B^3)C \quad \text{or} \quad W=(r^2+s^2)Hm+H^3c$$

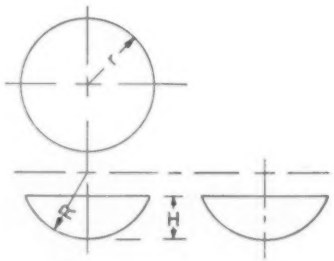
TABLE XX

Wt. per cu. in.	K	m	c	Wt. per cu. in.	K	m	c	Wt. per cu. in.	K	m	c
.096	.3016	.1508	.0503	.250	.7854	.3927	.1309	.410	1.288	.6440	.2146
.100	.3142	.1571	.0524	.260	.8168	.4084	.1361	.420	1.319	.6528	.2199
.110	.3456	.1728	.0526	.270	.8482	.4241	.1414	.430	1.351	.6755	.2251
.120	.3770	.1885	.0628	.280	.8796	.4308	.1466	.440	1.382	.6912	.2303
.130	.4084	.2042	.0680	.290	.9111	.4556	.1518	.450	1.414	.7060	.2356
.140	.4398	.2199	.0732	.300	.9425	.4712	.1571	.460	1.445	.7226	.2408
.150	.4712	.2356	.0785	.310	.9739	.4870	.1623	.470	1.477	.7388	.2460
.160	.5027	.2514	.0838	.320	1.005	.5027	.1675	.480	1.508	.7540	.2513
.170	.5341	.2676	.0881	.330	1.037	.5184	.1728	.490	1.539	.7697	.2565
.180	.5655	.2828	.0943	.340	1.068	.5341	.1780	.500	1.571	.7854	.2617
.190	.5969	.2985	.0995	.350	1.100	.5498	.1832	.510	1.602	.8009	.2670
.200	.6283	.3142	.1047	.360	1.131	.5655	.1885	.520	1.634	.8168	.2722
.210	.6598	.3299	.1100	.370	1.162	.5811	.1937	.530	1.665	.8325	.2774
.220	.6912	.3456	.1152	.380	1.194	.5969	.1989	.540	1.696	.8482	.2827
.230	.7226	.3613	.1204	.390	1.225	.6126	.2042	.550	1.728	.8639	.2879
.240	.7540	.3770	.1257	.400	1.257	.6283	.2094	.560	1.759	.8796	.2931

Interpolation Table

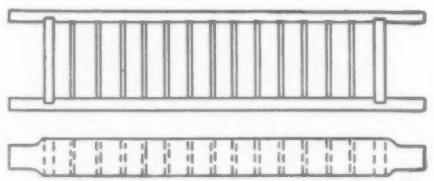
wt. Add'l	K Add'l	m Add'l	c Add'l	wt. Add'l	K Add'l	m Add'l	c Add'l	wt. Add'l	K Add'l	m Add'l	c Add'l
.001	.0031	.0016	.0005	.004	.0126	.0063	.0021	.007	.0220	.0110	.0037
.002	.0063	.0031	.0010	.005	.0157	.0079	.0026	.008	.0251	.0126	.0042
.003	.0094	.0047	.0015	.006	.0188	.0094	.0031	.009	.0283	.0142	.0049

For method of interpolation, see Table II.



To find the weight of a spherical segment of one base, multiply the square of the height by the difference between the radius of the sphere and one-third of the height by the value of K corresponding to the weight per cubic inch of material used, or, to the radius of the base squared multiplied by the height, by the value of m add the height cubed multiplied by the value of c.

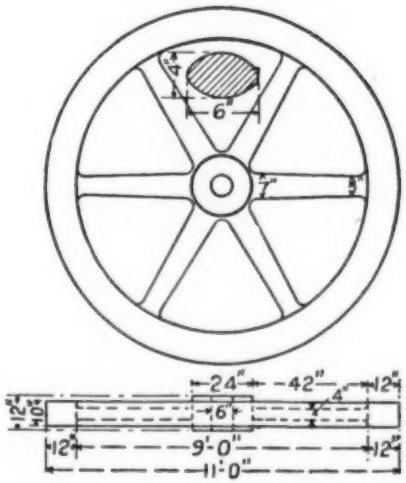
$$W=\left(R-\frac{H}{3}\right)H^2k \quad \text{or} \quad W=r^2Hm+H^3c$$



To find the weight of a body of sand where W = weight of body of sand in pounds; L = length of body of sand in feet; B = breadth of body of sand in feet, and H = height of body of sand in feet:

$$W = LBH \times 87$$

DETERMINING THE WEIGHT OF A SPOKED FLY WHEEL



To find the weight of a flywheel, 11 feet in diameter, having elliptical arms The first operation is to find the weight of the hub; second, the rim; and third, the arms. The sum of these gives the weight of the wheel. To find the weight of the hub:

$$W = (d + T)\,TL \times 0.817$$

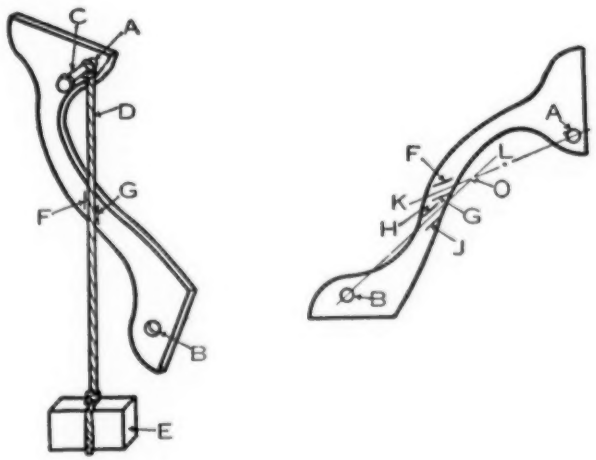
To find the weight of the rim, the same formula as above is used, considering it a cylinder, 10 inches long and 12 inches thick.

To find the weight of one arm where W = weight of casting in pounds; D = outside or large diameter in inches; d = inside or small diameter in inches; L = length in inches; T = thickness in inches, and B = breath in inches.

$$W = DdL \times 0.24$$

Multiply by six to find the weight of the six arms.

FINDING THE CENTER OF GRAVITY OF IRREGULAR FIGURES

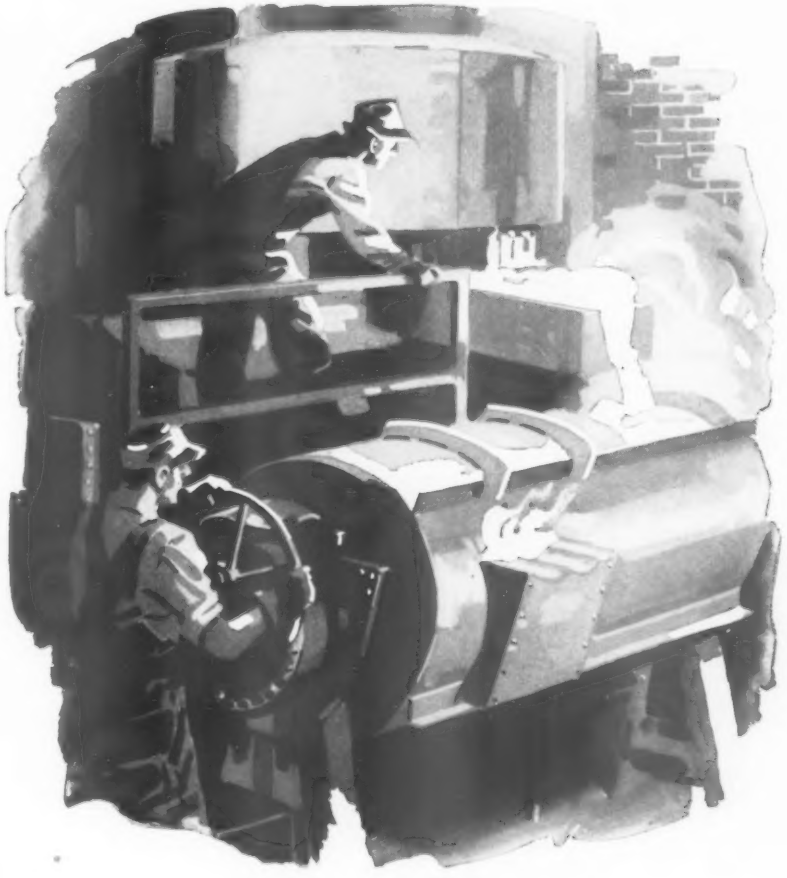


To find the center of gravity of any irregular figure, first lay out the figure on stiff paper, then cut it out and punch two holes, A and B, the diameter of which should be larger than that of the pin, C, then hang the body on the pin C, at A, so that it can move freely. Then attach a cord D, with a weight, E, to C, in such a manner that they can also move freely. When the body, cord and weight have come to rest, mark on the body the lines, F and G, along the sides of the cord. Then in the same manner, suspending the body at B, obtain the lines H and J, laying down the body on a piece of paper draw A-K, passing midway between F and G. Then draw B-L, and then the intersection of A-K and B-L, that is O, which is the center of gravity required.

VOLCLAY BENTONITE

NEWS LETTER No. 19

REPORTING NEWS AND DEVELOPMENTS IN THE FOUNDRY USE OF BENTONITE



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To obtain better casting surface, is to obtain denser molds. Denser molds are obtained by better sand flowability. *Flowability* is obtained by the choice of bond clay. PANTHER CREEK (Southern Bentonite) furnishes better flowability to molding sands than any other type of clay. Shake-out is good, hopper sand does not stick and there is less butting and tucking around the pattern.

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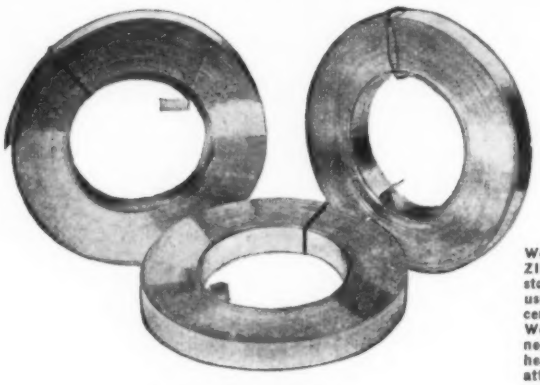

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Size of Letter	⅛"	3/16"	¼"	9/32"	5/16"	⅜"	½"	⅝"	¾"
Weight Roll in lbs. ..	1¾	1⅞	3	4	4½	5	7	7½	9
Number of feet in roll	112	100	160	145	115	105	95	80	80
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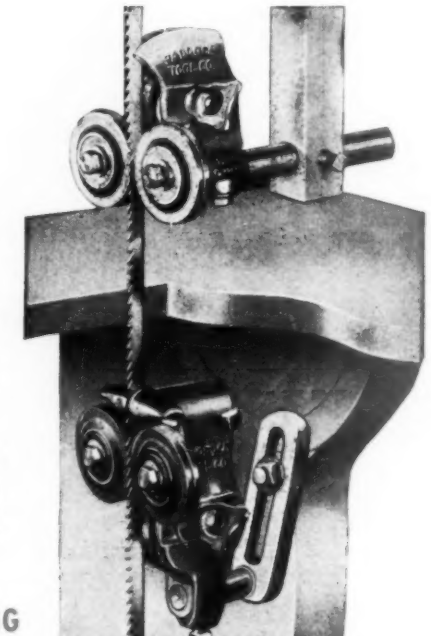

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(*Concluded from page* 135)

ko, Wehr Steel Co., presiding as chairman. Mr. Wellauer discussed the relationship of the various factors to hardness of steel castings, including ductability, impact, and quenching temperatures. Various slides were shown illustrating these different relationships. In discussing the effects of inclusion, Mr. Wellauer pointed out that they have less influence on the impact strength of high tensile steels than in the case of low tensile steels. Hardness levels are dependent on carbon content. The jominy test simplifies the problem of determining hardness values of different steels. The speaker indicated that natural variations in materials cause some variations in hardenability curves.

The second technical meeting was devoted to a discussion of "Dielectric Curing of Cores" presented by J. W. Cable, Induction Heating Corporation, N. Y., with Bradley Booth, Carpenter Bros. Inc., Milwaukee, as chairman. Mr. Cable described electronic core baking equipment used to bake cores made of dry binder. Mr. Cable explained that conventional methods of baking involve the flow of heat from the surface to the center of an object. Electronic heating, on the other hand, distributes equal amounts of heat to every unit volume of the mass. In addition to rapidity of baking, other advantages claimed for this type of equipment include superior collapsibility, permeability, shakeout and tensile strength.

Control Melting Operations

Final technical session was held Friday afternoon with Kenneth Geist, Allis-Chalmers Mfg. Co., as chairman and Walter R. Punko, Wehr Steel Co., as co-chairman. Charles O. Burgess, Union Carbide & Carbon Research Laboratories Inc., Niagara Falls, N. Y., spoke on effect of alloying and inoculation on the structure and properties of cast iron, and pointed out the importance of ability to produce uniform and predictable properties and structure in any specified grade of iron. Factors involved include selection of the iron charge, cupola operation, and casting practice, all of which must be controlled as closely as possible. While some of these factors are not directly controllable, variations in structure and properties of the irons may be adjusted through the use of inoculants. Effect of inoculants was illustrated by charts showing the results of additions of silicon-manganese-zirconium inoculant to electric and cupola irons.

• • •

Second gray iron session Thursday afternoon had Harold Sohner, International Harvester Co., as chairman and Norman Dunbeck, Eastern Clay Products Co., Jackson, O., as the speaker. He opened his remarks on synthetic molding sands by defining them as those mixed to suit specific conditions. The base sand may be naturally bonded sand or sand free from bond. Synthetic sands have their advantages and disadvantages. While it is said that synthetic sands dry out faster than naturally bonded sand, the actual fact is that due to a much lower moisture content in the synthetic sands, a slight loss of moisture has a more pronounced effect. Such sands are more difficult to patch because of their high flowability.

Advantages include better control of properties since the grain size and type of clay bond can be selected. Lower water content means less steam in the mold during pouring. High flowability of synthetic sand means that molds can be made faster. Better finishes can be obtained on castings surfaces, and cleaning is easier. Also less sand has to be piled for winter use.

Anneal Gray Iron

Third gray iron session, held Friday morning under the direction of Kenneth Geist, Allis-Chalmers Mfg. Co., had as the speaker James S. Vanick, International Nickel Co. Inc., New York, who discussed "Some Examples of Stress Relief and Annealing of Commercial Castings." He stated that engineers and foundrymen from time to time are confronted with the problem of whether or not castings intended for a specific application contain stresses which may interfere with their proper functioning. Fortunately, in the case of gray iron, the amount requiring stress relieving or annealing is comparatively small, being of the order of 10 per cent or about 1,000,000 tons. Of that total only 200,000 tons is subjected to full annealing to obtain high machinability.

Mr. Vanick pointed out that internal stresses often are the result of obstructions to free contraction during cooling, and showed numerous examples of those conditions which were corrected by various means such as filleting, ribbing, provision of better mold and core collapsibility, changes in design, application of different gating and risering systems, use of chills, adjustment of metal chemistry etc. However, in some cases those remedies do not alleviate completely all the stress, and the casting must be subjected to heat treatment to relieve it.

Stress relief heat treatments are intended to relieve stresses without depreciating physical properties, and the usual procedure is to heat the castings to some temperature below the critical range for a sufficient time and cooling slowly. Recent work carried on by Russell in Great Britain on stress-relief annealing confirms existing recommendations in this country that adequate relief can be obtained by heating uniformly to a temperature of 950 to 1100 F and cooling slowly enough to maintain various sections of the casting at the same temperature.

Recently castings expected to operate under pressure and at elevated temperatures have been classified to fit into ASTM specification A278-44T which includes a requirement that the castings be stress-relieved by heating them gradually and uniformly to 900 to 1050 F for a period of not less than 1 hour nor more han 2 hours per inch of thickness.

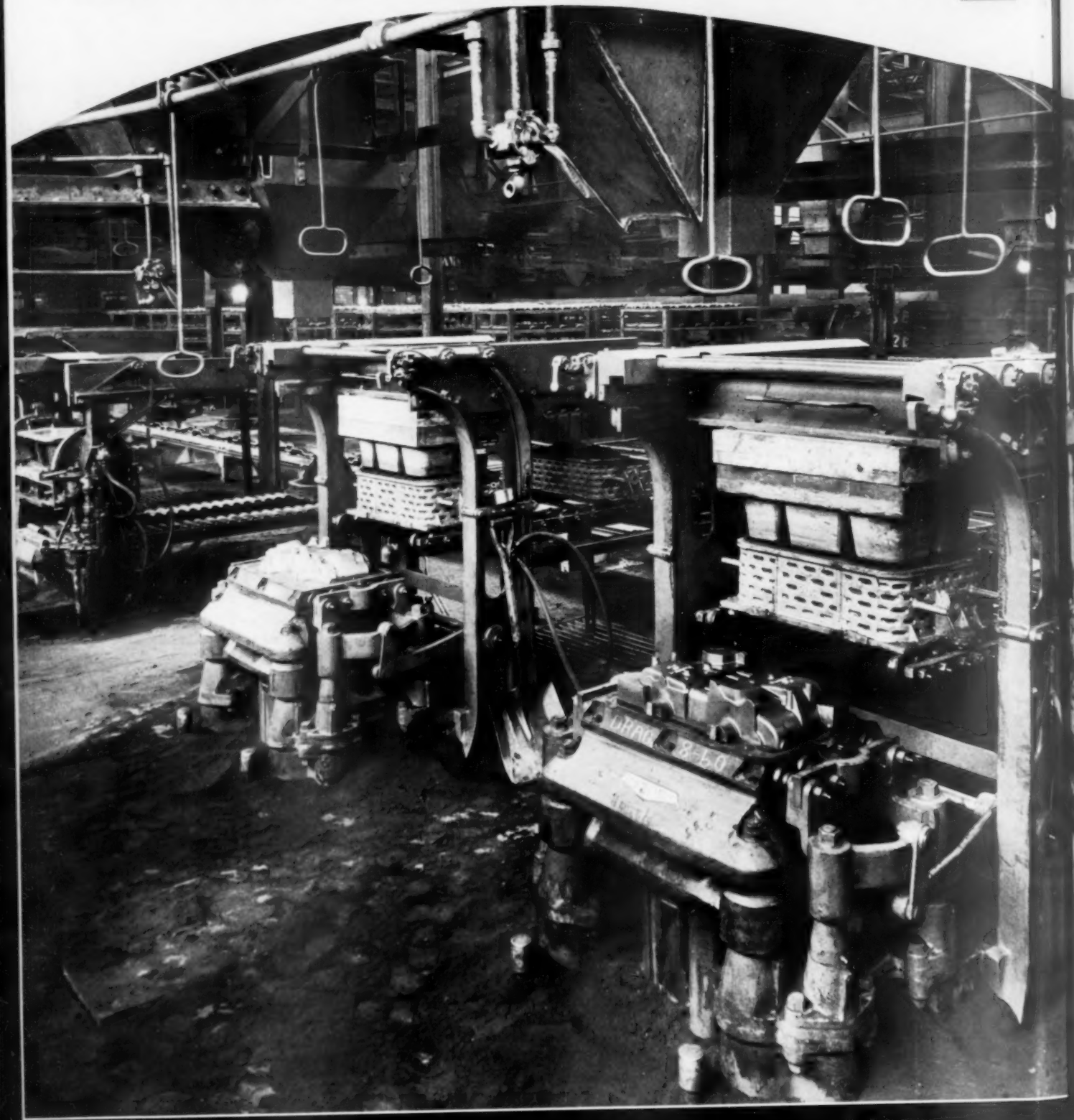
Cupola Melting Covers Wide Field

Final session on gray iron was held Friday afternoon with Tom Barlow, Battelle Memorial Institute, Columbus, O., as the speaker and George P. Antonic, Walter Gerlinger Inc., as chairman. Mr. Barlow's talk on "Cupola Control and Melting" covered a wide field since a number of factors are involved. To obtain uniformity in cupola operation constant vigilance is required to maintain established conditions. The cupola must be prepared properly from patching to burning in of the bed, use of correct iron and coke splits, and right blowing practice. For example, the bed should be measured not only by its height but also by the length of time it has burned; that is, it should be measured each day at the same time after being lighted.

During operation the lining burns out to some extent, and that changes the conditions within the cupola. Hence, it is advisable to use the best materials for patching, and see that the latter operation is performed properly so that the burn-out is held to the minimum. Since air is one of the principal materials entering the cupola, a check should be made to see that the proper amount is being introduced where it is required. For efficient operation the blower should be protected from dust and dirt. Piping or blast pipe from blower to cupola should be of the correct size and installed with the minimum number of turns. Joints should be tight to insure that the air reaches the cupola. Windbox must be kept clean and free from slag and iron. Sometimes dampers or deflectors are required at the tuyeres to provide uniform distribution of the air.

Proper coke split to be placed between iron charges will vary according to type of material used, desired tapping temperature, desired composition of the resulting iron, etc. Hence, coke-to-iron ratios may vary from 1 to 5 or 5½ up to 1 to 12 or 14. With light section scrap less coke may be used to melt and obtain a given superheat than where heavy scrap is used.

Durability a



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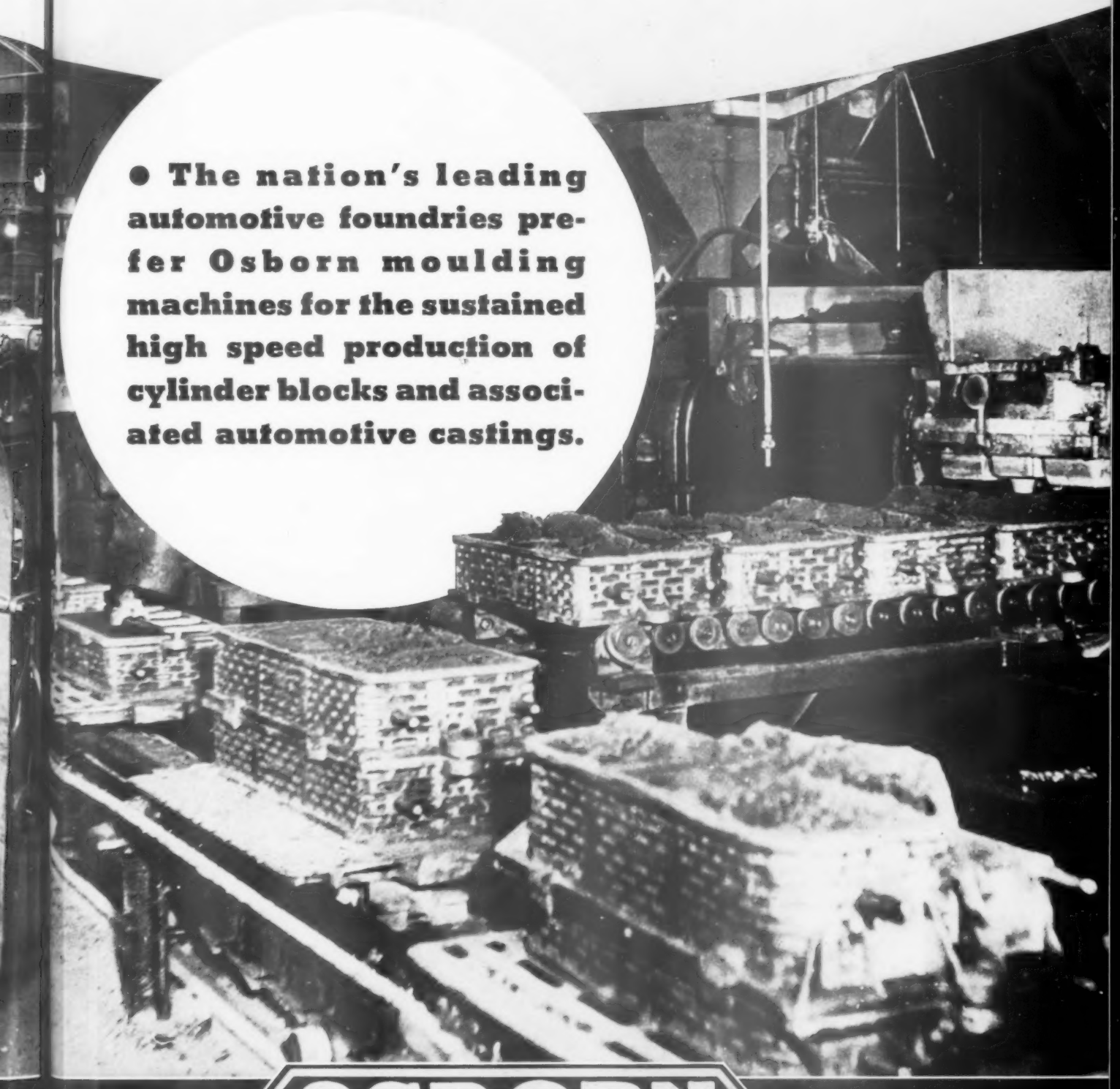

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FOUNDRY EQUIPMENT

Salvaging Iron Castings

With Machinable Arc Welds

Text and Photographs by
DAVID W. DeARMAND and SAMUEL EPSTEIN

IT HAS long been common practice to repair gray iron castings by welding. In the past, however, electrically welded repairs were generally of poor quality. Too often the welds were weak, porous, and cracked, and, when ferrous electrodes were used, the weld deposits were so hard that machining was impossible. Only since the development of special flux-coated nonferrous electrodes have machinable welds in cast iron been made successfully and easily with the electric arc.

Because the machining characteristics of the weld metal are similar to those of cast iron and the fusion zone surrounding the weld is narrow and soft enough to allow accurate machining, advantage can be taken of the speed of arc welding to make machinable repairs with these new electrodes. This has already proved economical in practice.

Castings broken or worn in use have been welded, machined and reinstalled in much less time than it would have taken to get new parts. Foundries have reduced the percentage of rejected iron castings through the use of these electrodes. In the demonstration of salvaging a defective casting which follows, Ni-Rod, an electrode development by the International Nickel Co. was used.

Welding with this electrode is no different than welding with conventional electrodes. It may be used with either direct or alternating current. In general, the welding current should be as low as possible for smooth operation, good bead contour, and a good "wash." The choice of electrode size depends on the thickness of the metal to be welded. Heavy deposits are recommended as the fewer the number of passes, the less the stress in the finished weld.

A short arc—about 1/16-in.—is suggested; and the weld metal may be laid down in either straight beads or by weaving. Weaving, however, should not exceed three times the diameter of the rod core being used.

Although preheating is not usually necessary to produce machinable welds

(*Continued on page* 148)

Fig. 1—Showing defects in flange and boss of 45-lb gray iron pump casing

Fig. 2—Casting ready for welding after areas surrounding defects had been chipped away

Fig. 3—All welds were made downhand using 5/32-in. diam electrode

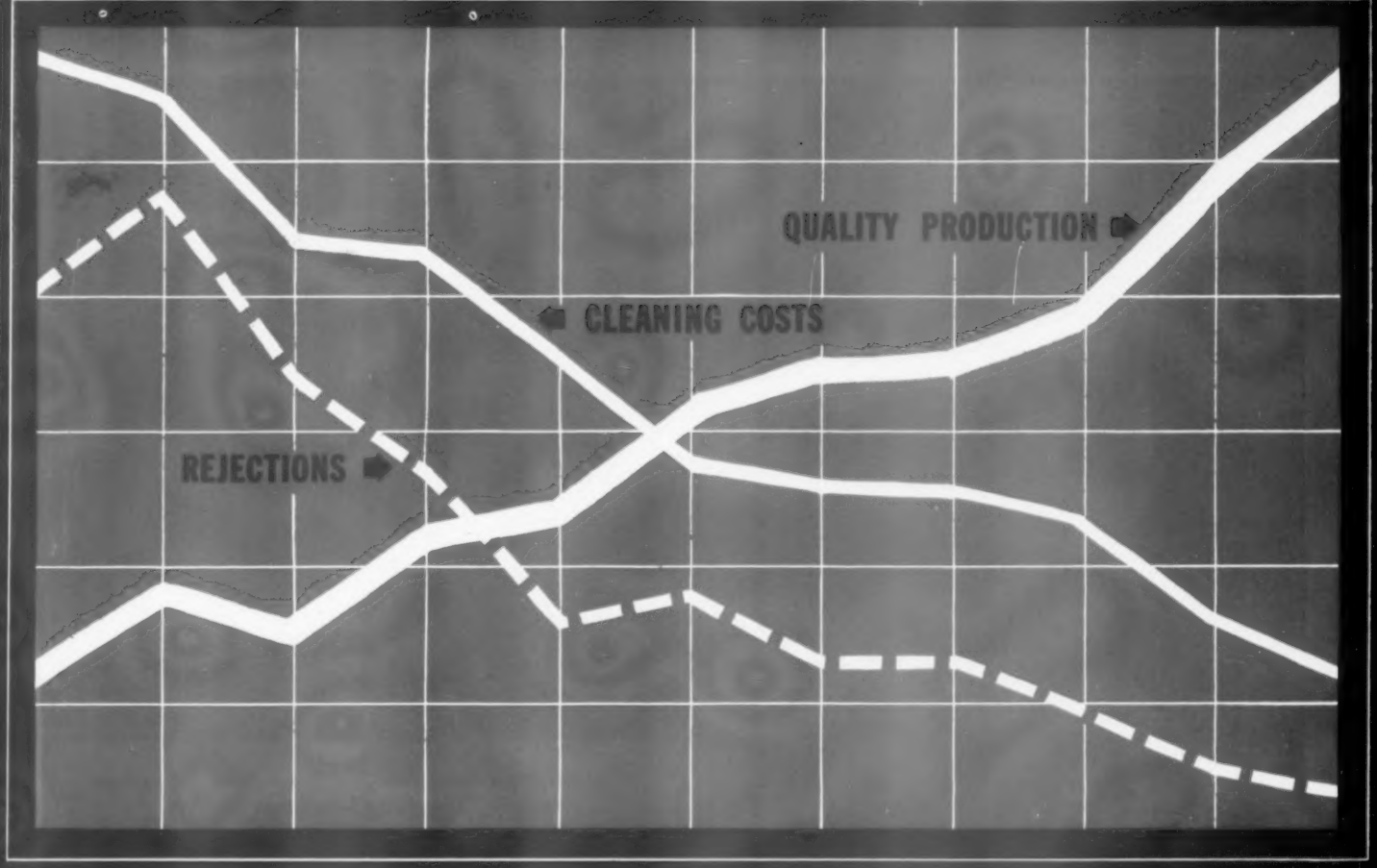

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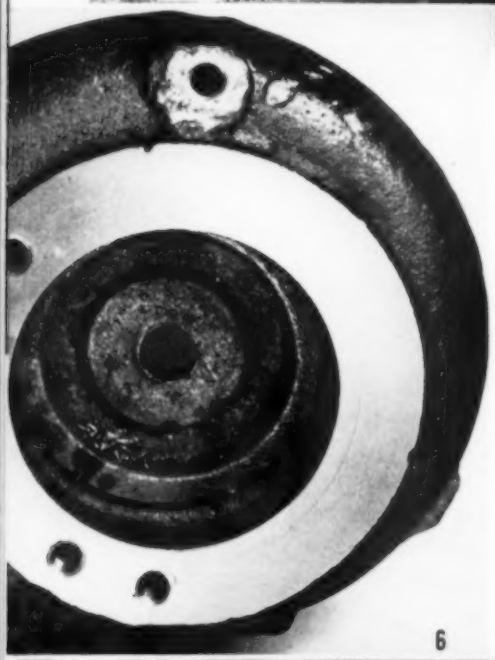
Fig. 4—Welds completed, as shown here. Approximately 30 minutes was spent welding

Fig. 5—Showing flange face part way through machining

Figs. 6 and 7—The welded casting upon completion of machining



(*Continued from page* 146)

with these electrodes, other factors may make this treatment advisable and sometimes essential. Castings that have been in service are frequently impregnated with oil which vaporizes under the heat of the arc and results in a weak and porous bead. Preheating the area to be welded to 750 F will drive off the volatile oil and make a sound weld possible.

Gassy castings are difficult to detect until welding is begun. However, if the first welding pass is porous and the casting is not oil impregnated, it is safe to assume the casting is gassy. Localized preheat to a dull red will eliminate the gas in the area to be welded. The porous pass should be chipped out, of course, before continuing to weld.

When the shape of a casting is such that internal stresses may result from the localized heat of the arc, preheating is necessary to minimize these stresses. In winter a casting may become abnormally cold, and therefore moderate preheat is desirable to prevent stresses resulting from excessive differences in temperature in the iron when welding.

In the accompanying photographs the casting has not been retouched except to remove the name of the manufacturer.

Fig. 1 shows a new, 45 lb, gray iron pump casing which was rejected because an area of the flange failed to fill during pouring. The unfilled area was about 4½ in. long, 1½ in. wide, and from ⅛ to 3/16 in. in depth. There were also several small surface blowholes, the worst one in a boss near the edge of the casing.

Chipping out the defective areas with a cold chisel in a pneumatic hammer took about 10 minutes. The areas surrounding the defects were chipped away until a sound base for the weld was reached, as shown in Fig. 2.

All welds (Fig. 3) were made downhand using 5/32-in. diameter electrodes drawing 110 amperes from a dc welding

(*Concluded on page* 254)

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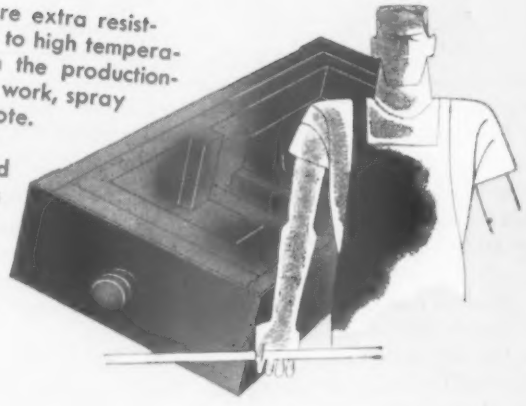

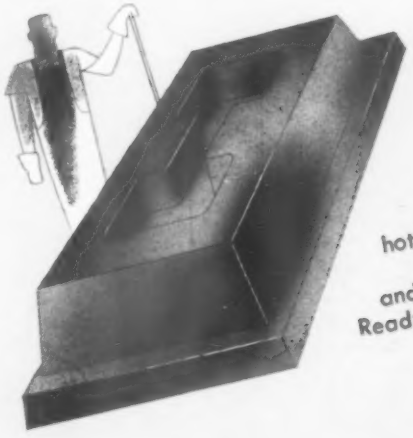

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NEW ENGLAND CONFERENCE

Draws 500 Eastern Foundrymen

By PAT DWYER
Engineering Editor
THE FOUNDRY

APPROXIMATELY 500 New England foundrymen with several outsiders from New York, Pennsylvania and Ohio attended the seventh foundry conference held at the Massachusetts Institute of Technology, more familiarly known as M.I.T., an extensive and impressive group of buildings in Cambridge, Mass., facing the Memorial Parkway and the paralleling Charles river which separates Cambridge from Boston.

The meeting, held Mar. 28-29, was sponsored by the New England Foundrymen's Association, M. I. T., American Foundrymen's Association, Boston Chapter of Non-Ferrous Founders' Society, Connecticut Foundrymen's Association and the Connecticut Non-Ferrous Foundrymen's Association.

Presiding as chairman at the opening session David L. Parker, General Electric Co., introduced Thomas K. Sherwood, Dean of Engineering, M.I.T., who extended a cordial welcome and the offer of any institutional facilities which might be required to make the affair a success. Touching on former conditions when the M.I.T. foundry and the course of instruction formed a comparatively small part in the general engineering course, he said all this had been changed recently with the development of a curriculum of business and engineering administration. This course going into effect in the fall term, 1947, makes it possible to train men as potential foundry executives in accordance with the expressed requirements of the Joint Industry Educational Committee. Curricula for this course and for a similar option in metallurgy and engineering were outlined.

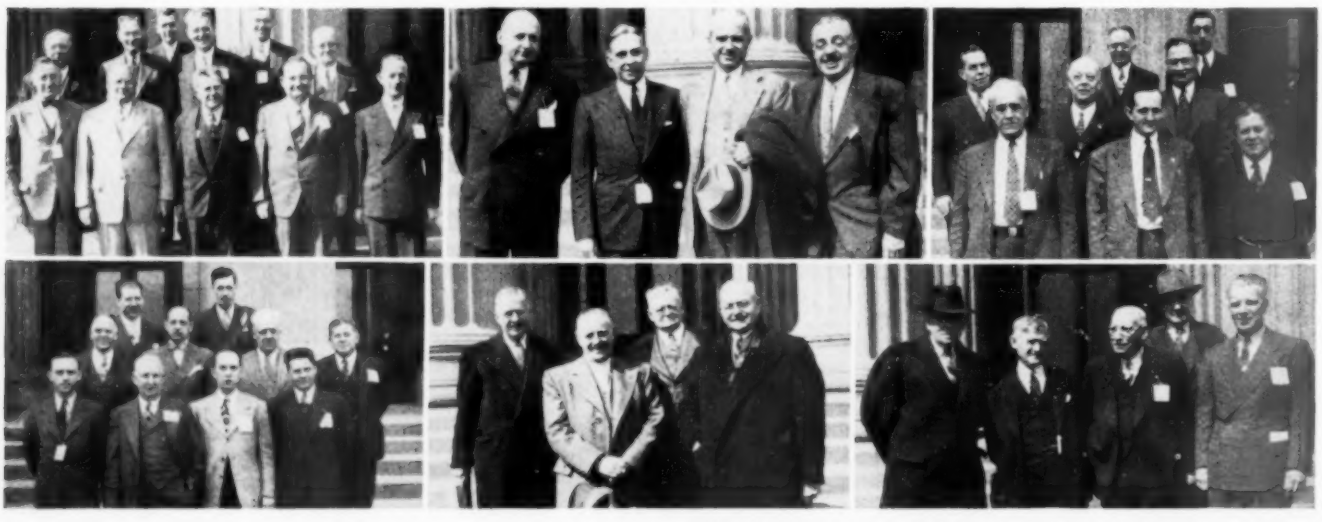
In addition to business training, formal instruction in basic and advanced foundry technology supplement theses and special problems in which the student works out practical scientific foundry assignments to the laboratory. Courses are given in ceramics, welding, industrial metallurgy, radiography and metallography which the student can take to supplement his foundry training. By a proper combination of subjects a well rounded background is provided. Thesis problems must be of an advanced character designed to give the student a thorough appreciation of the problems he will encounter in the foundry and which he will be expected to solve. Projects also can be arranged between M.I.T. and foundry organizations. It will be a regular policy to broaden the student's training by having recognized foundry authorities as guest lecturers.

At the first technical session under the chairmanship of Leroy M. Sherwin, Brown & Sharpe Mfg. Co., Providence, R. I., a paper on patterns and related foundry equipment was presented by Ray Olsen, Production Pattern & Foundry Co., Chicopee, Mass. In developing a theme that pattern design and construction may be extremely important factors where large production is involved, the speaker pointed out that patterns may be constructed of many materials and according to various methods. The question of how much should be spent on a pattern accompanies nearly every order. In many instances patterns are regarded as a necessary evil. As a plain matter of fact, in the speaker's opinion, castings are raw materials, and patterns are tools. Foundrymen and patternmakers should work with engineers on casting design. In too many instances the foundry is provided with a pattern that will serve to make the desired casting or castings, but at a cost out of all proportion to the service rendered.

The speaker favored the use of wood models in the early designing stage, especially for large patterns. Models are particularly useful in discussing interference and changes with the engineering department, also the molding and coremaking practice in the foundry. It may be possible to divide the job so that several patternmakers may work on the job. Models also aid the tool designer and machine shop supervision in building jigs and fixtures, and in laying out machining operations. A pattern engineer qualified for work of this kind should have a diversified background, based upon actual patternmaking and engineering experience. He should be familiar with foundry and machine shop practice.

Projecting a picture of a small cast iron elbow casting on the screen, and using purely hypothetical figures, the speaker showed how justifiable pattern cost depended almost entirely on the volume of

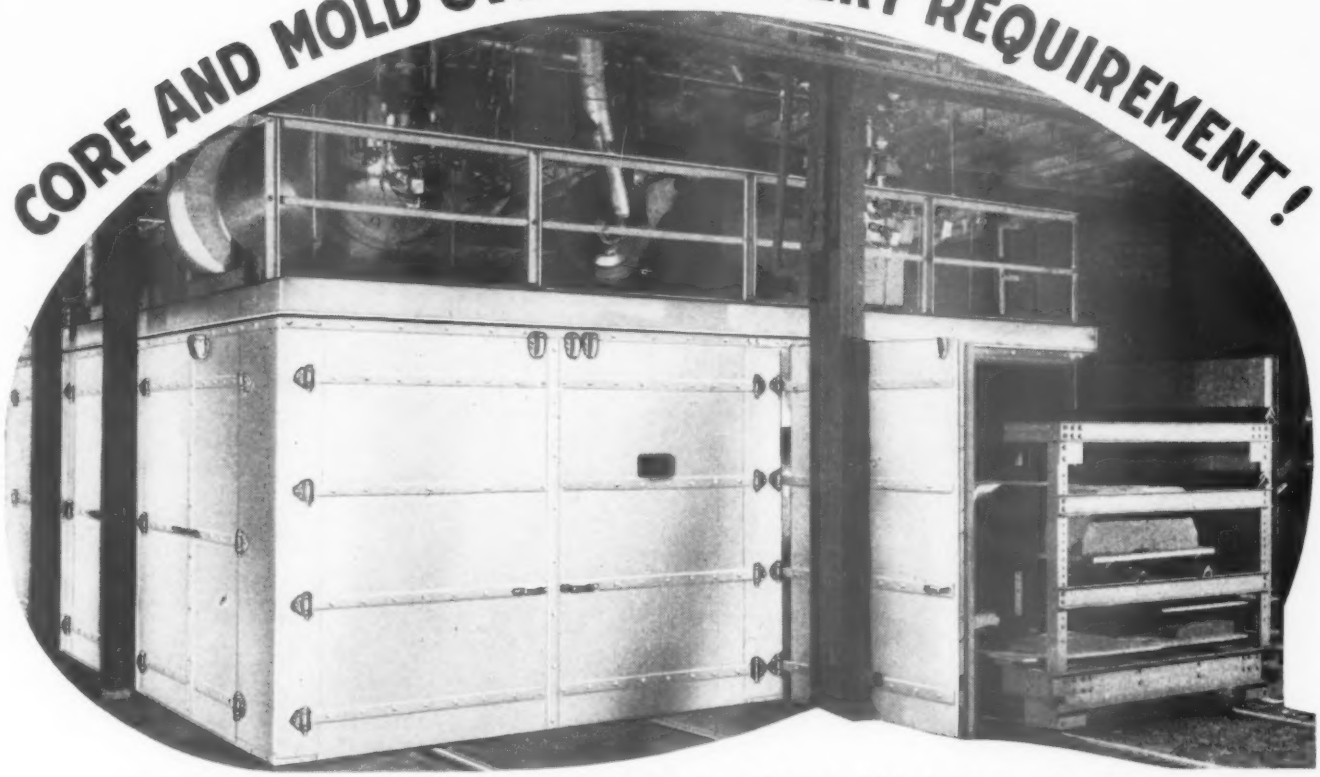
(*Continued on page* 153)



(Conference photos by C. A. Wyatt, Debevoise-Anderson Co., Boston)

A few of the participants in the annual foundry conference sponsored by various New England foundry associations

CORE AND MOLD OVENS FOR EVERY REQUIREMENT!



Two-Compartment Car Type Core and Mold Oven built for W. O. Larson Foundry Co.

One of many exclusive designs of Carl-Mayer foundry ovens.

Each compartment is 12′ wide, 26′ deep and 9′ high. One is used for baking large cores at night and has doors on side, permitting its use as a rack type oven during the day. The other is for night baking. Both are individually heated by a Carl-Mayer Recirculating Type Gas-Oil Heater enabling the use of EITHER GAS OR OIL.

CARL-MAYER OVENS combine top efficiency, operating economy and most durable construction.

For more than 25 years, leading foundries have come to Carl-Mayer again and again to meet their additional core and mold oven needs.

Write for Bulletin showing the extensive line of Carl-Mayer Core and Mold Ovens.

IMPORTANT CONCERNS LIKE THESE HAVE CHOSEN CARL-MAYER OVENS:

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Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
General Electric Co.
General Motors Corp. and Subsidiaries
Gilbert & Barker Co.
General Steel Castings Co.
Henry Kaiser Corp.
W. O. Larson Foundry Co.
H. B. Salter Co.
Shenango Penn Mold Co.
Studebaker Corp.
A. C. Williams Co.
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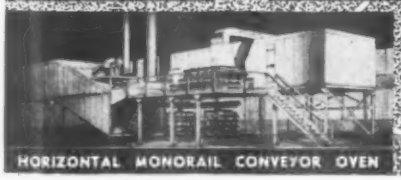
Whiting Corp.

ROLLING DRAWER OVEN

PORTABLE RACK OVEN

VERTICAL OVEN

CAR TYPE OVEN



HORIZONTAL MONORAIL CONVEYOR OVEN

The CARL-MAYER Corp.
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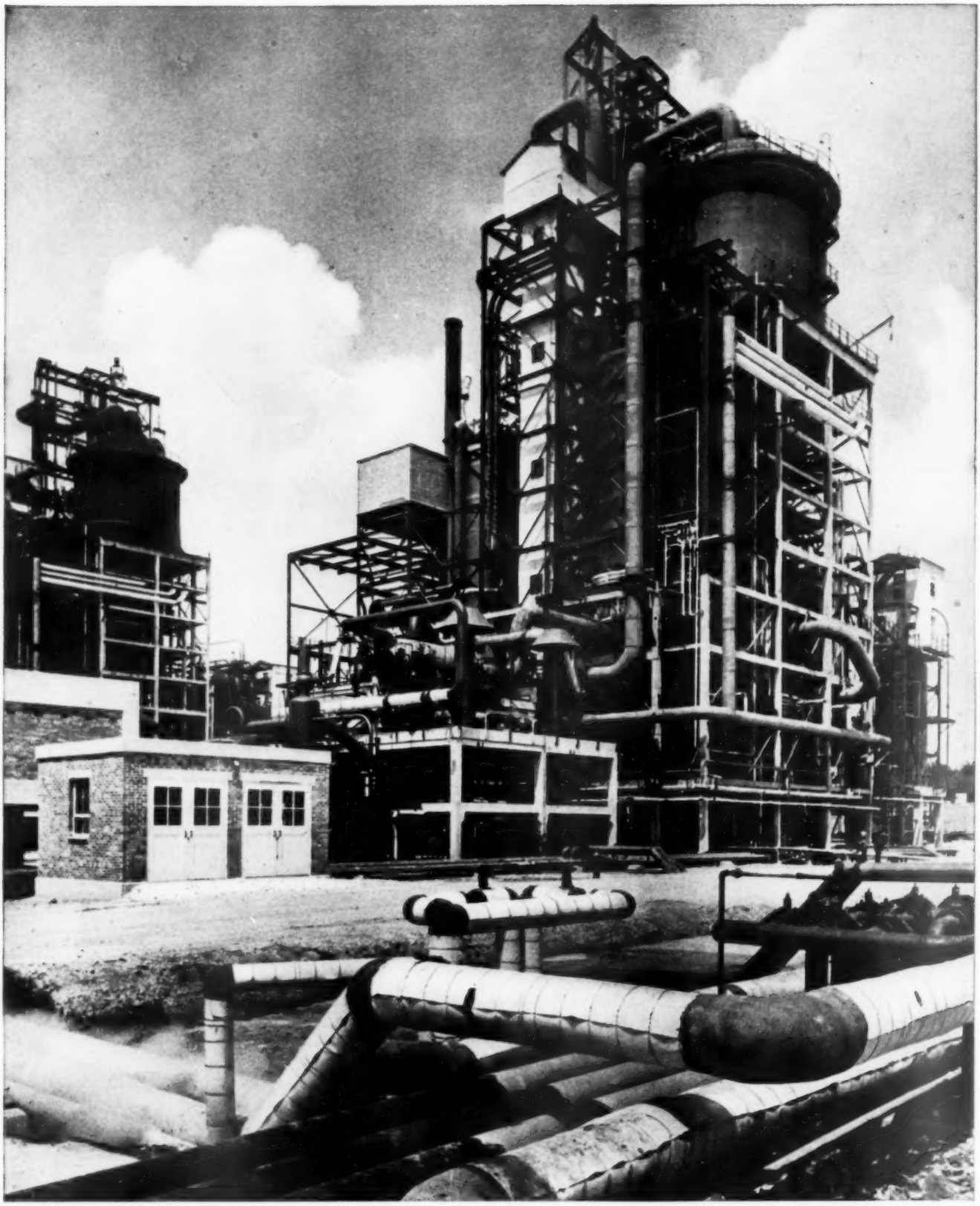
CORE AND MOLD OVENS



One of the three giant 20-story high catalytic-cracking units at the Cities Service Lake Charles Refinery in Louisiana. Starting from scratch, Cities Service built this mammoth plant out of a virgin forest, all new from the ground up. It is the most modern in the world and supplies the highest quality gasolenes obtainable. Cities Service Oil Company, New York, N. Y., Chicago, Ill.; Arkansas Fuel Oil Company, Shreveport, La.

CITIES SERVICE

(*Continued from page* 150)

castings required. For purpose of comparison a lot of 25 castings might be delivered from a plain split pattern and half corebox. Total pattern cost would be $80. On a larger order for 1000 castings the foundry might demand an aluminum matchplate with four patterns, a split aluminum booking corebox and 25 aluminum core driers. This outfit might cost $350, but the cost of the resulting castings is reduced by approximately 50 per cent. Another advantage is that the order can be completed in two weeks instead of in two months. After producing 2500 castings, and still in good shape for many more, the pattern has returned its complete value in direct savings.

Assuming that the casting order is for 50,000, several forms of pattern equipment are available and were described in considerable detail. For example, equipment at a total cost of $1500 would include an additional matchplate or machined cast iron patterns on cope and drag plates, a cast iron or steel faced aluminum corebox for use on a core blowing machine. With this equipment and a certain amount of auxiliary mechanization the casting price might be reduced another 50 per cent. This would return the pattern price three fold and produce the 50,000 castings in less than two months.

Welding Cast Iron

In the second paper presented at the morning session, H. E. Schultz, welding engineer, General Electric Co., described the theory, practice and technique employed in the welding of cast iron. Commencing about 50 years ago, the use of the electric arc and the oxyacetylene flame for cutting and welding metal gradually expanded to the present almost universal use of these mediums. Although used in the early days as a lance for opening blast furnace frozen tap holes and others of a related character, adoption as a welding tool was decidedly slow in the gray iron foundry. In recent years the oxyacetylene welding process has been widely employed.

The speaker explained that this change of attitude has been brought about by improvement in welding materials and methods and by the gradual education of foundrymen in the advantages of the process and in the technique of application. On this second feature he went into considerable detail, dwelling particularly on the necessity of providing a generous V opening and of exposing an absolutely clean surface where the welding material is to be applied. Replying later to a question from the floor he said that peening the treated area adds definitely to the strength, homogeneity, and machinability. Typical instances were cited to show where the process might be applied to a cold casting. However, in the majority of instances the casting must be raised to a red heat before attempting to weld it.

The 2 p. m. session chairman, E. H. Ballard, featured the presentation of the Lumen S. Brown lecture, established to commemorate the services of the late Mr. Brown, for many years president of the Springfield Facing Co., and a prominent member of the New England Foundrymen's Association. On this occasion the lecture, "Industrial Hygiene as Applied to the Foundry," was presented by Louis W. Woodhouse, industrial engineer, Bureau of Industrial Hygiene, Connecticut State Department of Health.

Basing his opinion on the premise that in the past the foundry has enjoyed a rather unenviable reputation, and further that certain changes will be necessary if the industry is to hold—and even more important——attract new workers, the speaker described in detail how the changeover from the former to the modern conception was accomplished in the aluminum foundry of the United States Rubber Co., Waterbury, Conn.

Summing up his observations, the speaker stated that while the various improvements relate to one specific foundry,

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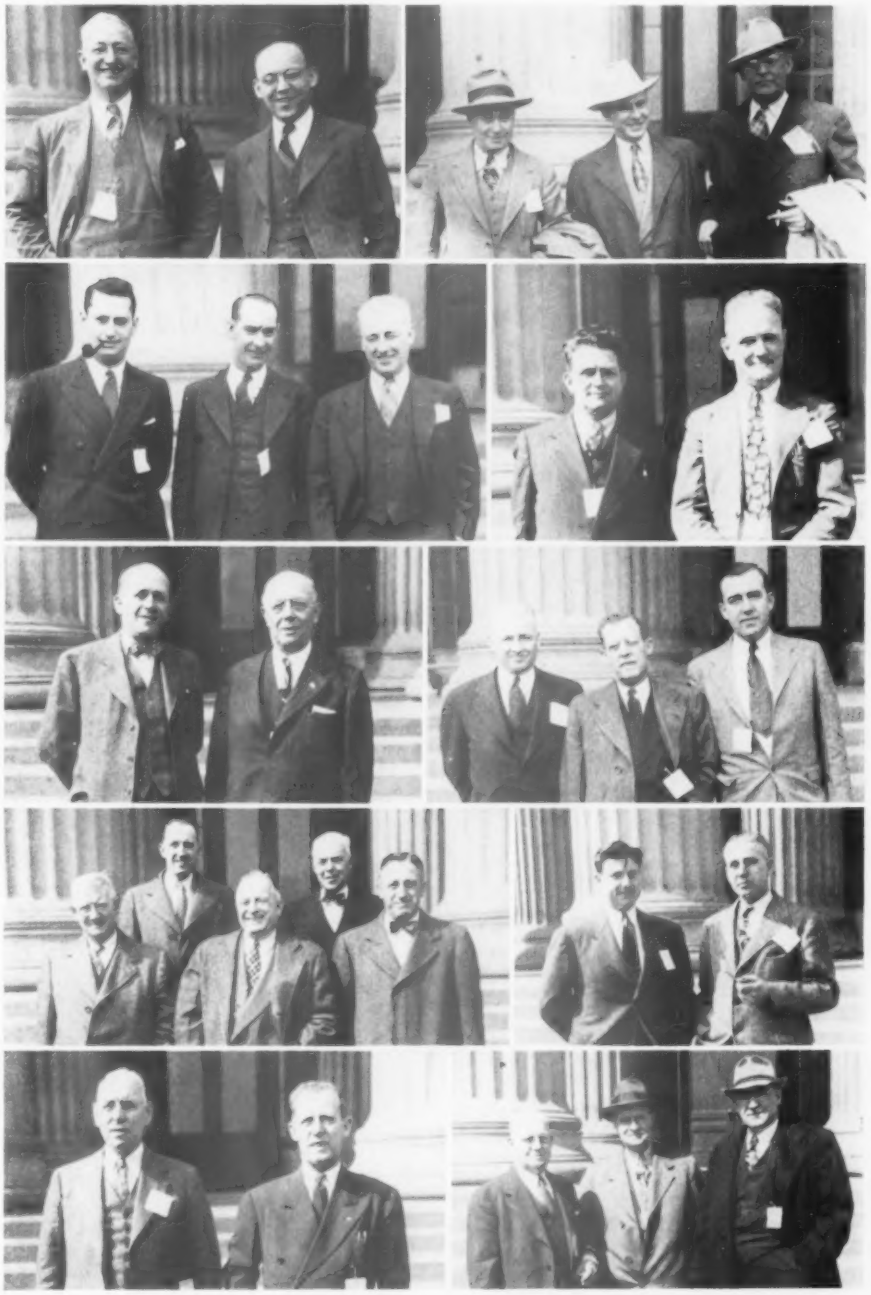
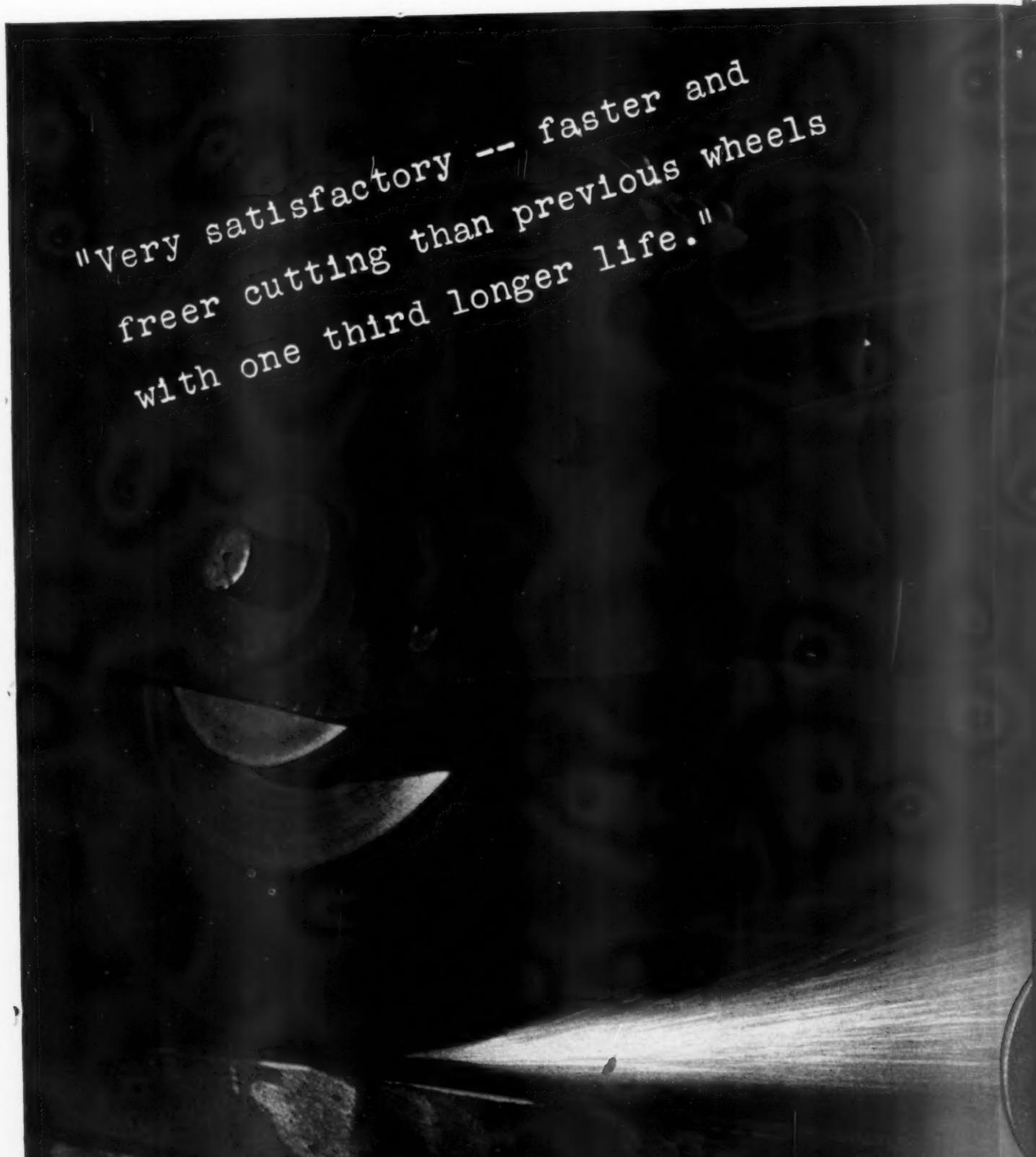


Additional views of foundrymen at Massachusetts Institute of Technology for the seventh New England Foundry Conference, Mar. 28-29


"Very satisfactory -- faster and
freer cutting than previous wheels
with one third longer life."

That's What They Are Saying About

NORTON B-5 and B-7 RESINOID WHEELS

IT'S TYPICAL of the comments from foundry after foundry where they've tried the new Norton B-5 and B-7 Resinoid Wheels. On floor stands, swing frame and portable grinders—on steel, malleable iron, gray iron and nonferrous castings these Norton wheels are making outstanding records—B-5 bond for wheels in the soft grades and B-7 bond for harder wheels.

In some foundries these wheels are showing a faster cutting action with the same wheel life; in others they are giving longer life with the same speed of cut; and in still others they are *both* cutting faster and lasting longer.

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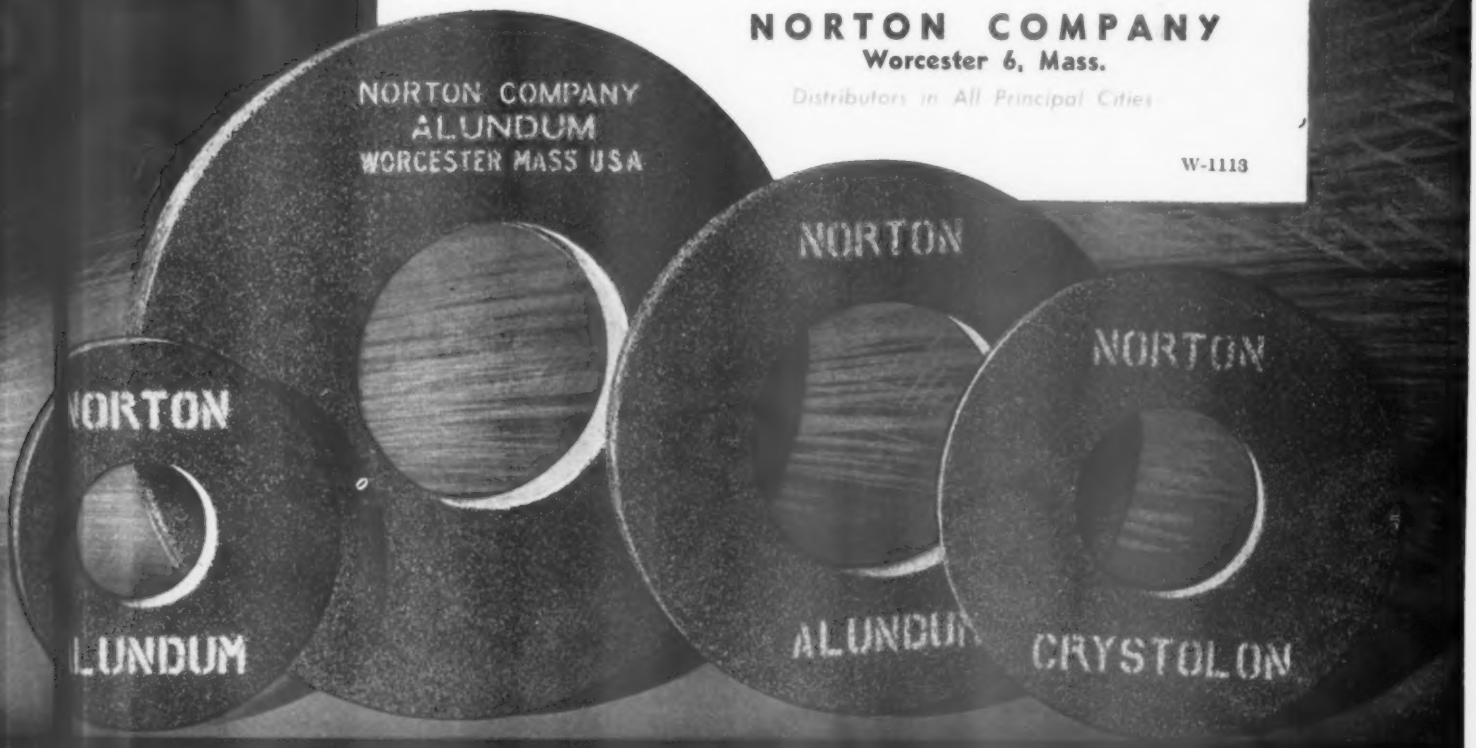

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Readily soluble in molten iron, the components of FERROCARBO briquettes provide powerful deoxidation and inoculation. Oxides are reduced and eliminated. Super-heated iron of greater fluidity is obtained. Foundry operating variables are reduced. Cleaner, sharper castings are poured.

2 IMPROVED STRUCTURE

Ferrocarbo-treated irons are characterized by a dense, close-grained structure, free from chill or porous areas even though varying widely in metal section. Uniform graphite size and distribution are obtained regardless of silicon-carbon ratio, thereby eliminating possible segregation.

3 SUPERIOR MECHANICAL PROPERTIES

The use of FERROCARBO briquettes insures a cast iron structure with improved mechanical properties, machinability and service performance.

CUPOLA addition of FERROCARBO briquettes to a properly adjusted charge greatly lengthens the useful life of all types of cast iron. For metallurgical advice on their use in your operation—for actual service data, write Department L-57, The Carborundum Company, Refractories Division, Perth Amboy, New Jersey.

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(*Concluded from page 153*)

the principles involved are universal in application. For example, the medical program always may be set up to provide preplacement physical examinations including chest x-ray diagnosis, periodic re-examination, regular medical consultation service and nursing care. The large foundry or the small captive foundry operating as part of a plant may provide an extensive hospital with a full-time physician in charge, a corps of nurses and elaborate equipment, including x-ray apparatus. The small individual foundry may extend the same protection to its employees through a physician specializing in foundry problems who will take the responsibility of setting up a medical program. This is particularly true in large industrial areas where a single medical unit may be set up to serve several small establishments.

Mechanization of processes, which exerts so great a bearing on the possibility of dust and heat control and the elimination of a great proportion of manual labor, must be engineered on a tailor-made basis. Practically speaking, no two foundries are exactly alike. Problems encountered in a gray iron, steel, malleable or even another aluminum foundry, may differ to a considerable extent from those outlined at the United States Rubber Co. plant. However, it is safe to say that, irrespective of local conditions, mechanization with modernization of medical facilities, lighting, sanitation and good housekeeping will pay dividends in improved employee health, morale and output per man.

Describes Synthetic Core Binders

Synthetic core binders and their place in today's foundries were described at the 2:45 p. m. session by H. C. Frisbie, manager of foundry sales, eastern division, E. F. Houghton & Co., Philadelphia. At this session Dr. Walter W. Saunders, Providence, R. I., served as chairman. The speaker pointed out that synthetic resins or plastics were first developed approximately 40 years ago and were introduced into the foundry as thermo setting core binders about 27 years ago. Manufacturing costs at that time prohibited general acceptance. Advantages claimed include: They reduce baking time; resist over baking; reduce shakeout time; eliminate scrap castings due to hot cracks, gas or metal penetration. Description was confined to two of the several hundred types now available to industry—synthetic urea formaldehyde and synthetic phenol formaldehyde. These materials are wholly synthetic and are not to be confused with pine tree resins.

Following a recital of several typical cases where the binder had solved difficult problems the speaker devoted some time to a description of electronic baking in which the oven time is reduced to a few minutes, or in some instances to a few seconds. For example, standard tensile strength core specimens 1 sq in. cross section are baked out in 30 seconds.

Following a general reference to foundry modernization and mechanization programs, C. B. Dick, manager of the feeder division, Westinghouse Electric Corp., presented a detailed description of how a program of this kind was developed and installed in the Trafford, Pa., plant of the corporation. Castings in this plant vary in weight from a few ounces to large turbine bases weighing approximately 80 tons.

The concluding paper of this session, "Summary of Latest Developments in the Steel Foundry," and including special reference to the theory, development and application of atmospheric risers, was presented by Prof. Howard Taylor, Massachusetts Institute of Technology.

Introduces Liquid Plastic

At the morning session Saturday, presided over by A. S. Wright, metallurgist, Hunt-Spiller Mfg. Corp., South Boston, two papers were presented. The first by Tom Barlow, Battelle Memorial Institute, Columbus, O., covered in detail many of the operating, chemical and physical problems encountered in cupola melting of gray iron. The second paper, "Chemically Coated Molding Sand," was presented by N. J. Dunbeck, vice president, Eastern Clay Products Co., Jackson, O. The speaker explained that this chemically coated sand accepts the use of sand as the base material but puts an improved, refractory and reactive surface on the grains. The coated sand is bonded with bentonite or clay in the usual manner in a muller, without any addition of sea coal or pitch. Cereal binder may be used if necessary. After each use the sand is rebonded and liquid plastic is added.

Under the chairmanship of D. F. Sawtelle, metallurgist, Malleable Iron Fittings Co., Branford, Conn., a discussion on nonferrous problems was led by S. W. Chappel Sr., foundry superintendent Electric Boat Co., Groton, Conn. A considerable part of Mr. Chappel's discussion was devoted to a description of the many problems encountered in developing a centrifugal process for casting bronze torpedo tubes, 22 in. diam., 9 ft long and weighing 2700 lb.

In the unavoidable absence of S. W. Brinson, master molder, Norfolk Shipyard, Portsmouth, Va., his paper, "Casting Defects and Remedies," was presented by Prof. Howard Taylor. The final paper, "Gates and Risers for Sound Gray Iron Castings," was presented by Henry C. Winte, metallurgist, Worthington Pump & Machinery Corp., Buffalo, N. Y.

Program for the conference dinner Friday night, presided over by Merton A. Hosmer, Hunt-Spiller Mfg. Co., South Boston, included addresses by Dr. James R. Killian, vice president, M.I.T.; S. V. Wood, president, AFA; and W. W. Maloney, secretary, AFA. Moving pictures showed "The Modern Manner," a General Motors product, and an official American League Baseball picture. The conference closed Saturday night with a party in the Parker House, sponsored by the makers and distributors of foundry equipment and supplies, and featuring a dinner, floor show and distribution of prizes.

Merton A. Hosmer served as general chairman of the committee on conference arrangements with vice chairman D. L. Parker, General Electric Co., Lynn, Mass. Members of the committee included: Charles Bailey, Arthur F. Dockry, Frank Elliott, J. Erler, Frederick M. Fitzgerald, Henry Griggs, W. Byron Hagerman, H. H. Judson, Raymond Meader, Charles F. Merrill, D. A. Nemser, Robert M. Rehm, Dr. Walter M. Saunders Jr., D. F. Sawtelle, Leroy Sherwin, J. B. Stazinski, Louis Tarantino, Prof. Howard Taylor, R. C. Walker, A. S. Wright, Albert Ziegra.

AIME Plans Regional Conference

First annual regional conference on "Technology of Metals" will be held at Hotel Sheraton, Boston, May 23-24, under sponsorship of the Institute of Metals Division, American Institute of Mining and Metallurgical Engineers. One of the technical sessions will be devoted to discussions on "New Developments in Nonferrous Metallurgy," and another will consist of a physical metallurgy seminar on "Flow and Fracture of Metals."

Meeting in Brazil

Associacao Brasileira de Metais (Brazilian Society of Metals) will hold its third annual meeting at Sao Paulo and Volta Redonda on May 12 to 19. From May 12 to May 15 technical sessions will be held in Sao Paulo with some mornings devoted to plant visitations in the vicinity. Participants will leave Sao Paulo on the evening of May 15 for Volta Redonda and spend May 16 visiting the plant of Companhia Siderurgica Nacional. Technical sessions will be held on May 17 at Volta Redondo.

Activities of Foundry GROUPS

Central Illinois

"PRINCIPLES of Cupola Operation" was the subject of the Mar. 3 meeting of Central Illinois Chapter of the AFA at Hotel Jefferson, Peoria, Ill. Ralph A. Clark, metallurgist, Electro Metallurgical Co., Chicago, was the speaker.

Mr. Clark used slides to illustrate the results of proper and improper cupola operation. He stressed cupola diameter, height of bed, stock height and coke sizes. He also emphasized the importance of good supervision and conscientious charging crews.—*G. H. Rockwell.*

Texas

A PICTURE on "Blast Cleaning" and a talk on "The Future of Castings in Highly Stressed Machine Parts" were features of the February meeting of the Texas Chapter of the AFA which was held in the Varsity Room, Ye Old College Inn, Houston, Tex., Feb. 21.

The film was presented by a representative of the American Wheelabrator & Equipment Corp. and showed the operation of and various installations and applications for this type of cleaning equipment.

D. J. Martin, Hughes Tool Co., spoke on "The Future of Castings in Highly Stressed Machine Parts." Mr. Martin, who received his doctor of science degree from Harvard in 1934, was closely associated with the production of centrifugally cast gun tubes at Watertown Arsenal. He was colonel in the Office of the Chief of Ordnance in Washington during the war and as such was in charge of the design, development, production and procurement of all cannon.

Mr. Martin discussed the use of centrifugally cast gun tube and statically cast breech rings in World War II as illustrations of the use of castings in highly stressed parts. He traced the history of castings in ordnance work from the brass cannons of ancient times up through the high tensile steels of World War II.—*W. H. Lyne.*

• • •

Regular meeting of the Texas Chapter of the AFA was held at the Beaumont Hotel, Beaumont, Tex., Mar. 21. Nathan Janco, president, Centrifugal Casting Machine Co., spoke on "Centrifugal Castings."

Mr. Janco discussed the three methods of casting centrifugally: True centrifugal, semicentrifugal and centrifuging. He illustrated his talk with slides of various castings produced by centrifugal methods. He spoke of the various types of molds which may be used in producing centrifugal castings and mentioned the advantages and disadvantages of each type.

Mr. Janco pointed out that more progress had been made in the centrifugal casting of soil pipe and steel but some experimental work is being done now with aluminum and magnesium alloys.

He discussed the manufacture of bushings by the centrifugal method and said that, contrary to common belief, it is now possible to centrifugally cast 30 per cent lead alloy in certain sections and under carefully controlled conditions.

Ampco Products Co. furnished a film entitled "A Metal Without An Equal." Chairman W. M. Ferguson appointed the past directors on the nominating committee who are to select nominations for next year's officers.

A resolution of commemoration was submitted by F. M. Whittlinger, Texas Electric Steel Casting Co., Houston, for the faithful service rendered by L. H. August, Hughes Tool Co., Houston, during his many years of participation in the founding and activities of the Texas Chapter. This resolution was approved and will become a permanent part of the chapter's minutes and a copy will be presented to Mr. August's family.—*M. W. Williams, program chairman.*

Birmingham

ONE of the most interesting technical sessions ever presented before the Birmingham District Chapter of the AFA was conducted by W. B. George, foundry engineer, R. Lavin & Sons Inc., Chicago, Mar. 21 at the Tutwiler Hotel, Birmingham.

Mr. George had as his subject "Brass Foundry Practice." He emphasized the proper installation of the crucible, allowing the proper dimensions between crucible and furnace lining at all points. Correct operation of the furnace was then explained as the greatest need for the successful operation of a brass foundry.

Proper gating was also discussed at great length and to the satisfaction of all concerned. Picture slides and blackboard illustrations gave ample opportunity for discussion of points in question. Questions from the floor were allowed throughout the discussion and resulted in Mr. George giving the audience the bene-

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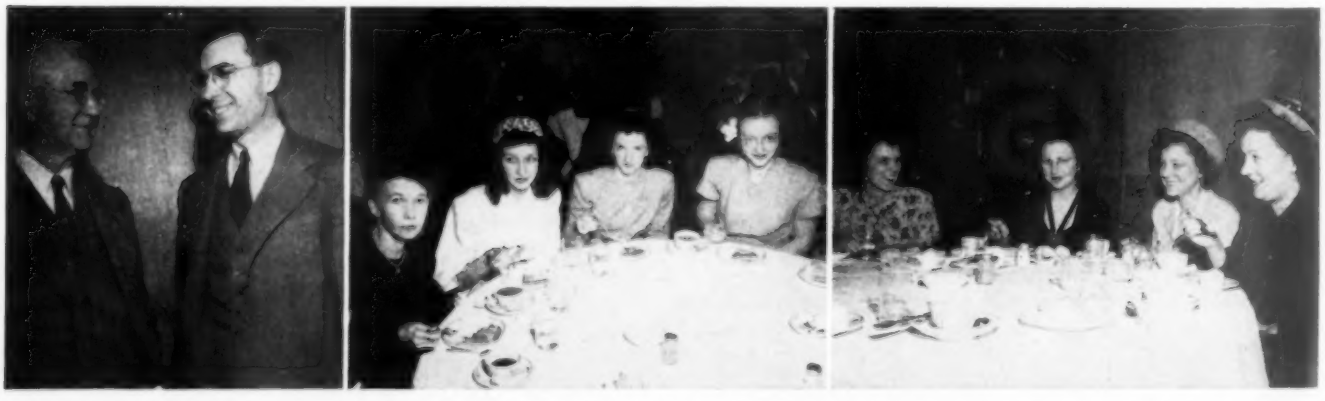

CENTRAL ILLINOIS: First panel, left to right—L. E. Roby, president, Peoria Malleable Casting Co., Peoria, Ill., and Ralph A. Clark, metallurgist, Electro Metallurgical Co., Chicago, speaker at the Mar. 3 meeting of Central Illinois Chapter. Second and third panels show a group of girls employed by the Caterpillar Tractor Co. foundry office, Peoria, who are regular attendants at chapter dinner meetings. (Photos courtesy Caterpillar Tractor Co.)

Foundry management, watching mounting costs, sees profits in MOGUL. This perfect Green Bond makes money because it decreases drying time, yields smooth cores and reduces discards. MOGUL works profitably with pitch or resin because cores can be handled warm. For both green and dry strength use MOGUL in cores.

KORDEK is an equally perfect Dry Bond. Used in smaller quantities than most dry binders, KORDEK produces better quality castings with fewer discards.

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You Can Always Bank on the Uniform High-Quality of Smith L-O Core Oil

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You will find this uniform, high-quality core oil minimizes run-outs and blows; produces cleaner, more accurate castings; gives results that afford greater savings in time, effort, and money.

Whether you are engaged in jobbing or production work . . . preparing small or large cores, you will increase foundry efficiency and step up production with Smith L-O Core Oil. Order your supply from the Smith representative nearest you . . . today!

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- William F. Rose, Tomkins Tidewater Terminal South Kearny, New Jersey
- Southwest Foundry Supply Co. Houston 7, Texas
- Malcolm G. Stevens Arlington, Mass.
- M. W. Warren Coke Co. St. Louis, Missouri
- Western Foundry Sand Co. Seattle, Washington
- Western Industrial Supply Co. Portland 14, Oregon

Smith L-O *Core Oil*

CORE WASH ROD DIP LIQUID PARTING

SMITH OIL & REFINING CO.
INDUSTRIAL OILS DIVISION . . . ROCKFORD, ILLINOIS

(*Continued from page* 158)
fit of his knowledge on the points in which the most help was needed.—*J. P. McClendon, publicity chairman.*

Philadelphia

PHILADELPHIA Chapter of the AFA held its regular monthly meeting Mar. 14 at Franklin Institute. Dr. G. H. Clamer, president, Ajax Metal Co., and dean of the Philadelphia Chapter, acted as host to a capacity crowd.

A brief business meeting was held by the directors, followed by a general get-together of the guests, after which dinner was served in the Franklin room. After dinner the guests assembled in the auditorium.

Dr. Clamer gave a brief address and introduced the speaker, Daniel Mannix, naturalist, author and falconer, who was accompanied by his famous trained American eagle. Mr. Mannix showed color motion pictures entitled "Mexican Adventure," covering the training of the eagle and its use in hunting giant lizards in the Mexican wilds. He then gave a demonstration, which astounded the guests, by having the eagle fly about the auditorium.—*H. V. Witherington.*

St. Louis

TIMELY and interesting was the talk on "Human Relations in the Foundry" given by Steven G. Garry, labor relations department, Caterpillar Tractor Co., before the St. Louis Chapter of the AFA at the York Hotel, Mar. 13.

Mr. Garry described a number of experiences that he had had in personnel handling, describing procedures followed in handling grievances, relationships of the working men to foremen, plant superintendents and other representatives of management. The importance of improving relationships and maintaining cooperation and good will was emphasized and certain fundamental rules were suggested for the development and maintenance of employee good will and productivity.

(*Continued on page* 164)

PHILADELPHIA: Scenes at Franklin Institute, Philadelphia, where the Philadelphia Chapter, AFA, held its monthly meeting, Mar. 14. Above shows members of the speaker's table, below the crowd at dinner

Patent No. 2055548

ADAMS STEEL JACKETS

Patent No. 2124639

ADAMS JACKETS

Cast Iron and Aluminum

Patent No. 2228856

ADAMS CHERRY SNAP FLASKS

With Adjustable Lever Latch

STRAIGHT OR TAPERED

Patent No. 2066547

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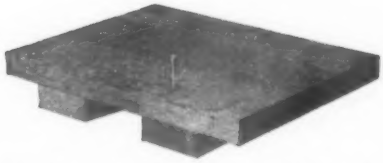
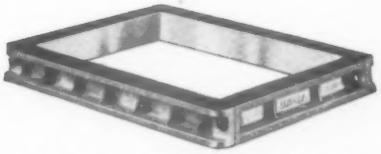


ADAMS WOOD BOTTOM BOARD



ADAMS ALUMINUM UPSET

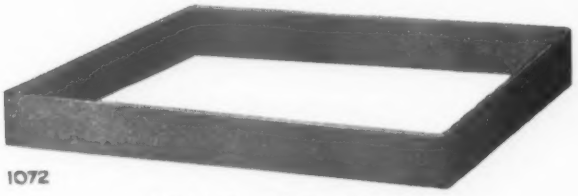
ADAMS CHERRY PRESSER BOARD

Patent Applied For

ADAMS CHERRY EASY-OFF FLASK

Patent No. 2066547

ADAMS ALUMINUM SLIP FLASKS



1072

ADAMS STEEL BANDS

ne of FLASK EQUIPMENT

Cherry Snap Flasks	Steel Jackets
Cherry Slip Flasks	Aluminum Jackets
Aluminum Slip Flasks	Cast Iron Jackets
Easy-Off Flasks	Steel Bands
Cherry Presser Boards	Steel Upsets
Wood Bottom Boards	Cherry Upsets
Steel Bottom Plates	Aluminum Upsets

COMPANY

IOWA, U.S.A.

EQUIPMENT . . . . . Established 1883

(*Continued from page* 161)

Luther Kleber, General Steel Castings Corp., led the discussion period and keen interest was displayed by the audience. William Burgdorfer, Missouri Pattern Works, described the local apprentice training contest which is being held in connection with the local elimination for ultimate entry in the Detroit Apprentice Contest. It was announced that local patternmakers would offer first, second and third prizes in addition to the St. Louis Chapter prizes.

A sound, color film, "Trout Fishing in Missouri," was shown through the courtesy of Joe Weber, member of the Missouri Fishing Commission.—*John W. Kelin.*

Chesapeake

IN HIS talk at the March meeting of the Chesapeake Chapter of the AFA, L. A. Taylor, Illinois Clay Products Co., Joliet, Ill., stated that defective castings in 1945 cost foundries $170,000,000 based on an average 5 per cent scrap loss. Mr. Taylor's talk was entitled "Sand Properties and their Relation to Casting Defects."

Many causes for rejects can be controlled, in Mr. Taylor's opinion. Of the 30 AFA classifications for defective castings, 21 can be attributed to sand. While many think of molding sand as being cheap, it can be most expensive when improperly prepared or handled carelessly. He added that the control of moisture in synthetic sands is most important.

When selecting the base sand, consideration should be given the core sand properties as well as system sand. Other governing factors are grain shape, size and distribution. The most advantageous sand is one with 70 to 80 per cent of the grains on four adjacent screens. While sand strength tests are not altogether indicative of the behavior of sand in a mold, they can be most helpful in tracing the causes of faulty work. It is possible to have two sands with the same green strength but one much better because of new sand additions.

Mr. Taylor illustrated his talk with slides.

* * *

Members of Chesapeake Chapter of the AFA were invited by the Baltimore Chapter of the American Society for Metals to a joint meeting at the Engineers Club, Mar. 17. Dr. C. H. Lorig, supervisor of research in foundry metallurgy, Battelle Memorial Institute, Columbus, O., spoke on "Cast Metals," with Dr. T. C. Jarrett, chief metallurgist, Koppers Co. Inc., Piston Ring Division, technical chairman.

The scope of Dr. Lorig's address covered the economic, metallurgical and engineering features of the foundry industry. In his discussion of economic features, the transition due to the war and their effects on the cast metals field were described.

To promote the foundry industry to the public and to bring about a more efficient functioning of the many groups in the various fields, the different trade and technical associations of the castings industry are sponsoring the National Castings Council, according to Dr. Lorig.

He went on to say that cast iron is more complex than steel with the matrix of carbides, graphite and ferrite. Nevertheless, a good foundryman, familiar with the variables, can control the properties at will.

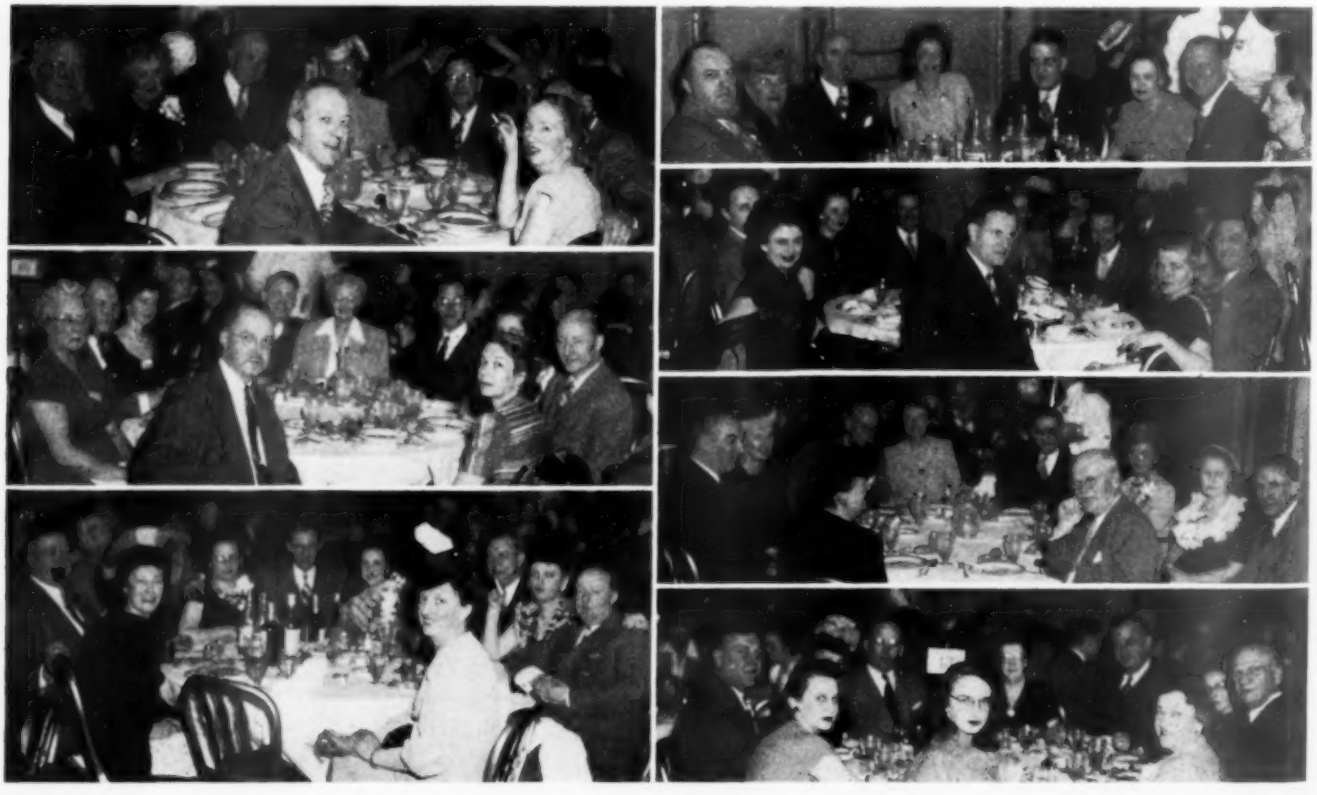
In closing, Dr. Lorig pointed out that contrary to popular belief, magnesium alloys are corrosion resistant. However, nickel, iron and copper are detrimental to the corrosion resistance of magnesium alloys.—*J. Arthur Reese, chapter recorder.*

Chicago

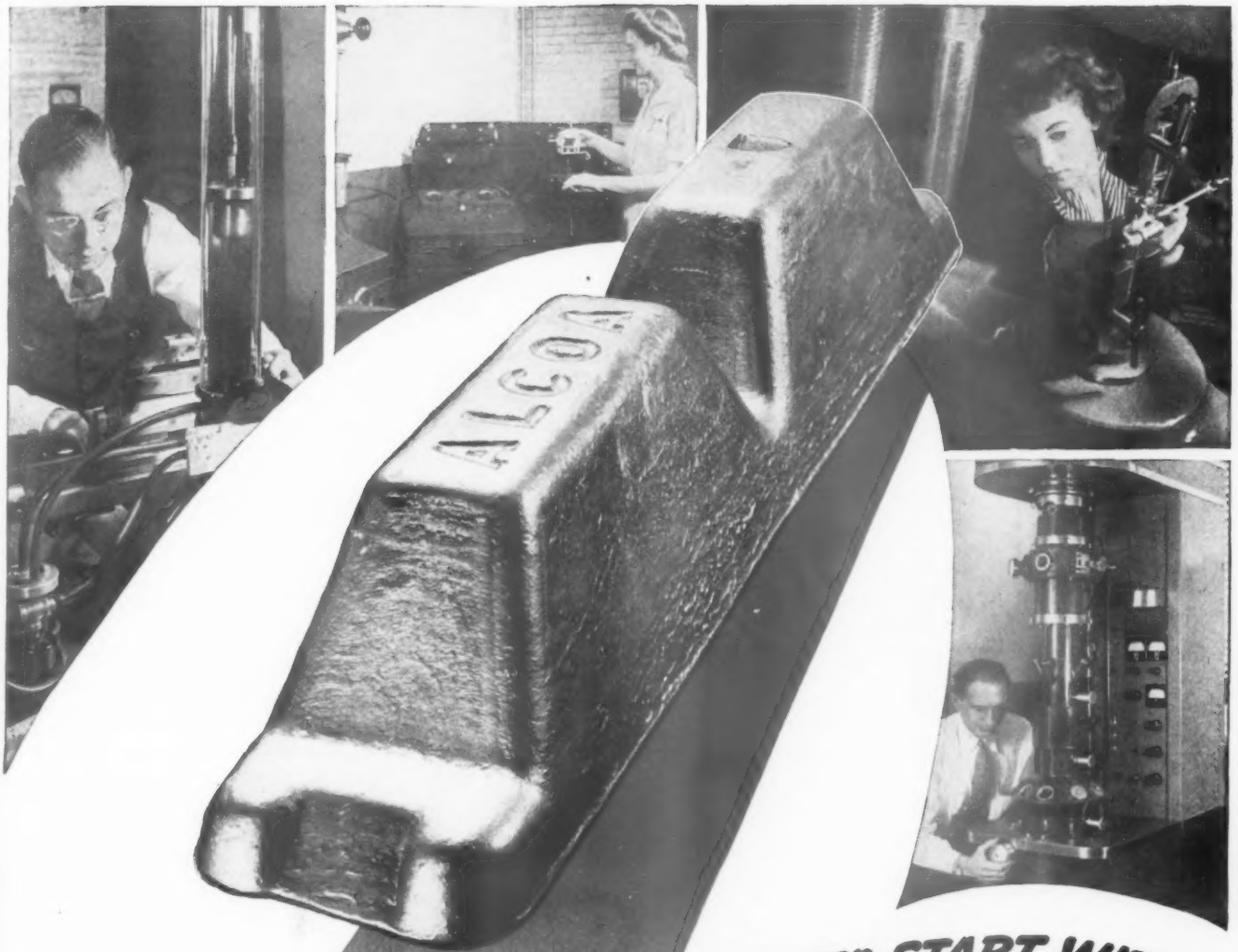
FOUNDRY practice and shop talk were laid aside for the Apr. 7 meeting of the Chicago Chapter of the AFA, and the diversion paid rich dividends. Members and their guests heard a top-ranking and inspiring address on "America Tomorrow" by Carl Taylor, president, Waukesha State Bank, Waukesha, Wis. Following its delivery, the speaker received numerous compliments.

The meeting, attended by about 200, and held at the Chicago Bar Association, was presided over by Chapter President L. H. Hahn, metallurgical supervisor, Sivyer Steel Casting Co., Chicago. Chap-

(*Continued on page* 166)



CHICAGO: Views of some of the guests at Ladies Night party held by the Chicago Chapter of the AFA at the Palmer House, Feb. 15. Photos courtesy of George Biddle, Illinois Clay Products Co., chapter reporter.



Just to make sure it's **BETTER TO START WITH**

Here, in the Aluminum Research Laboratories at New Kensington, Pa., are many chemists, metallurgists, engineers, working with the finest of modern equipment. The realistic urge is to make better aluminum, to warrant the confidence of foundrymen everywhere in the quality of the Alcoa Pig and Ingot they buy . . . "Better to Start With", their castings will be better at final inspection. ALUMINUM COMPANY OF AMERICA, 1823 Gulf Building, Pittsburgh 19, Pa.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

IN EVERY COMMERCIAL FORM

(*Continued from page* 164)

ter Vice President, Fred B. Skeates, foundry superintendent, Link-Belt Co., Chicago, introduced the guest speaker.

Mr. Taylor began his address by posing the question "What kind of an America would you like to live in tomorrow?" From this beginning, he enumerated and dwelt with policies of our federal government which tend to restrict freedoms and to enslave individuals and business. In summarizing, he asked another question —"how far does the government's domination have to go before the people will take action to make government the servant of the people as the constitution intended?"

Submitting the report of the nominating committee, Walter W. Moore, superintendent, Burnside Steel Foundry Co., proposed the following chapter officers for 1947-48: President, Mr. Skeates; vice president, Chester K. Faunt, works manager, Christensen & Olsen Foundry Co.; and secretary, Victor Rowell, sales technician, Velsicol Corp. The office of treasurer, now occupied by Bruce L. Simpson, president, National Engineering Co., is appointive by the board of directors.

Nominees for directors for three-year terms include Retiring President Hahn; George W. Anselman, service engineer, Geobig Mineral Supply Co.; W. B. George, metallurgist and foundry engineer, R. Lavin & Sons Inc.; and Robert M. Jones, foundry superintendent, South Works, Carnegie-Illinois Steel Corp.

Election and installation will take place at the May 5 meeting.—*Erle F. Ross.*

Saginaw Valley

OVER 150 members and guests of the Saginaw Valley Chapter of the AFA heard J. L. Lucas, Meehanite Metal Corp., New Rochelle, New York, speak on "Waste in the Foundry Industry" at the regular meeting Apr. 3 at Frankenmuth, Mich.

Pointing out that during the war low production costs were necessarily secondary to the major requirement of large quantities of castings in minimum time, Mr. Lucas urged foundrymen to scrutinize again all operations and personnel to eliminate waste and thus lower costs.

(*Continued on page* 168)

SAGINAW VALLEY Chapter members at a recent monthly meeting. Top panel, left to right, shows William Bridges, song leader John Smith, chapter chairman; Robert Leckie, speaker; Arthur H. Allen, Detroit Chapter chairman, and Kenneth H. Priestly, chapter director

Redford CORE BLOWER CARTRIDGE TYPE

A few of the thousands of cores that are made daily on Redford Core Blowers.

• PROVEN •

Hundreds of foundries are using **Redfords** as an efficient low cost means of producing small cores. **The high percentage** of reorders we receive proves that **Redfords** are profitable to own.

• SIMPLICITY •

The Redford reduces core blowing to its simplest form. Anyone can understand—operate and maintain it.

• SPEED •

All the work of handling core box and driers is done on the machine. **Cartridges** can be quickly loaded by hand. **As many** as 200 boxes are being blown and drawn by one operator in one hour.

• FLEXIBILITY •

With a Redford you can make any number of different cores without loss of time for changeovers. Here is what a large jobbing foundry has to say: "We are using 7 Redfords. Your development of the portable cartridge which can be made a part of the core box equipment, has given us all the advantages of core blowing without loss of flexibility so essential to us."

SAND CARTRIDGES AVAILABLE IN 10 STANDARD SIZES

Blower comes complete, ready to use. Each blower provided with one Size "C" sand cartridge which is adaptable to a large range of core boxes. Cartridges are available in nine additional standard sizes and special sizes furnished where needed.

WE HAVE THE "KNOW HOW" AND WILL ASSIST YOU IN SOLVING YOUR CORE BLOWING PROBLEMS

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(*Continued from page* 166)

Lantern slides were used to assist the speaker in his examples of wasteful foundry practices in connection with labor, materials, production planning, plant layouts, etc.

Some of the causes of waste Mr. Lucas listed under labor were: Poor planning of work to be done, molders doing work normally done by unskilled labor, poor housekeeping, excessive rest periods, lazy and indifferent employees, lack of any incentive plans for workers and inadequate identification of equipment.

Some of the wastes involved in materials were listed as: Mixing of scrap materials for cupola, poor housekeeping, failure to analyze critical cupola materials such as pig iron and to pile them accordingly, failure to recover metal, splash, use of excessive sprue and riser sizes and overflowing iron in the molds.

In closing, Mr. Lucas recommended that plant management appoint a committee of two or three men to check through the plant for waste and to record savings realized from improved practices.

Following the talk a sound, color film on "Alaska Adventure" was shown through the courtesy of Phil Rich, editor, *Midland Daily News.*

• • •

APPROXIMATELY 140 chapter members and guests were present for the Mar. 6 meeting of the Saginaw Valley Chapter of the AFA to hear Zigmund Madacey, foundry superintendent, Caterpillar Tractor Co., discuss "Core Blowing."

Mr. Madacey's talk was illustrated with lantern slides by means of which he showed the rigging, coreboxes and cores produced. With suitable rigging short runs of cores (as few as 25 pieces) can be economically produced, the time for changing from one box to another being a matter of a couple minutes.

In speaking of sand control, he recommended rigid adherence to moisture standards (about 1.8—2.0 per cent for small work, 2.0—2.5 per cent for large work) to assure sound cores and to minimize sticking in the boxes. Sand which is too dry produces erosion of the boxes.

General Motors motion picture on India concluded the program.—*Joseph J. Clark, reporter.*

Sponsors Foundry Booth at Scout Show

OVER 20,000 persons visited the Oakland, Calif., Scout-O-Rama at the Oakland auditorium, Feb. 20 to 22. Sponsored by the Oakland Junior Chamber of Commerce the show contained 87 booths depicting boy scout activities. Northern California Chapter of the AFA sponsored the foundry merit badge booth which was selected as one of ten displays recorded on colored, sound motion picture film.

The foundry booth was in actual operation with the scouts of Oakland Troop 11 melting aluminum in a small gas-fired furnace and pouring souvenir castings.

Upper left panel is a view of the foundry merit badge booth. Scoutmaster Sam Dodson and son stand by prior to the opening of the show. In upper right panel second from the left is Sam Russell, Phoenix Iron Works and national AFA director; third from left is Joe Melling, H. C. Macaulay Foundry Co., and official foundry technician in charge of instruction for Oakland Troop 11. They are flanked by scouts of the troop. At lower left, Al Ricette, Bay Shore Foundry, demonstrates molding technique to scouts. At lower right a section of the crowd watches the foundry in action.

Northern California

REGULAR monthly meeting of the Northern California Chapter of the AFA was held at the Engineers' Club, San Francisco, Feb. 14.

Main speaker of the evening was R. A. Quadt, chief metallurgist, technical research division, Federated Metals Division, American Smelting & Refining Co., Perth Amboy, N. J., and also chairman of the ASTM Aluminum Alloys Committee, B7, subcommittee 1.

Mr. Quadt pointed out that the casting of aluminum is a practice which has existed only for a generation and is not so inhibited with customs and theories as are the older known metals. His talk was confined to personal observations of problems confronting users of aluminum casting alloys.

In speaking of the condition of metal to be melted he stressed the effect of surface corrosion caused by adverse storage conditions. This condition is a prime cause of pin hole porosity. Hydrogen of the atomic type is the gas which is soluble in aluminum. It can be introduced through the products of combustion, combined water from skimmers, ladles, etc., absorption through crucibles and by the introduction of hygroscopic fluxes.

He added that turbulence created in the transfer of molten aluminum and in pouring molds should be minimized to reduce the formation of oxides. Best practice indicates straight melting, bringing the melt up to above pouring temperature (not over 1500 F) and then cooling to the lowest temperature necessary to run the casting; 1450 F is apparently the maximum temperature for good practice, although special alloys such as those containing titanium, may be poured hotter.

(*Continued on page* 170)

Sound Advice On MECHANIZATION Of Foundries

Brass—Bronze—Aluminum—Magnesium

Steel — Malleable — Gray Iron

If you are contemplating a NEW foundry or the modernization of your existing plant, we offer you our specialized experience in the design, construction and operation of modern foundries. Foundry layouts, production studies, special machinery and tools for efficient foundry operation—we have concentrated exclusively on the successful solution of these problems for the past quarter-century.

We invite you to send for a copy of

BULLETIN "F"

which discusses the problem of foundry modernization

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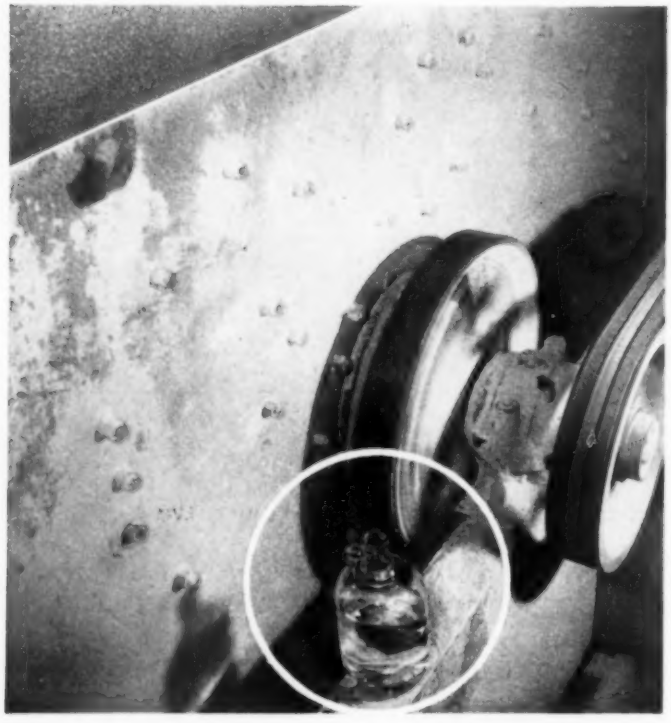

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Note in the above photo the water jug resting on the base frame of a Seco vibrating screen moving at 1000 R. P. M. shows no vibration. This means all the vibration is kept in the live body of the screen. Result . . . faster, cleaner sand, less wear and tear on moving parts, and no undue stress on the supporting structure. Put a dependable Seco to work on your screening job! Write for "A Guide to Better Screening." Dept. G.

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In Canada: United Steel Corp., Ltd., Toronto

(*Continued from page* 168)

Preceding Mr. Quadt's talk, M. F. Woodruff, U. S. Department of Commerce, spoke briefly on the functions of his department, pointing out that its job was to obtain facts and figures and make them available to business.

Chapter President Richard Vosbrink, Berkeley Pattern Works, reported that arrangements for classrooms and instructors had been completed and that over forty apprentices had been registered for the current apprentice training class in San Francisco.—*Charles R. Marshall, publicity chairman.*

New England

REGULAR monthly meeting of the New England Foundrymen's Association was held at the Engineer's Club, Boston, Mar. 12, with about 140 members and guests present.

Speaker for the evening was Fred W. Hanson, metallurgical engineer, service and development department, Electro Metallurgical Co., New York. He spoke on "Melting Problems of Today."

Mr. Hanson discussed the versatility of the cupola as a melting unit and difficulties in maintaining constancy of operation in view of the limited availability of melting materials. He also discussed reasons for shortages in pig iron and scrap and the possibilities for substitution of various grades of these materials for those more commonly used.

The effect of incidental elements, such as sulphur and phosphorus, both of which have been increasing in scrap available for melting, and the possibilities of eliminating some of these difficulties were expressed. Mr. Hanson spoke of the necessity for using steel scrap and outlined methods. He mentioned briefly the possible effects of the so-called "residual tramp alloys," such as lead, tin, boron, antimony, zinc and others.

A number of slides were shown picturing effects of different alloying materials under dissimilar conditions and in irons of varying compositions.—*Merton A. Hosmer.*

Twin City

K. F. LANGE, Link Belt Co., Chicago, presented an analysis of foundry mechanization to the Twin City Chapter of the AFA at the Curtis Hotel, Feb. 8.

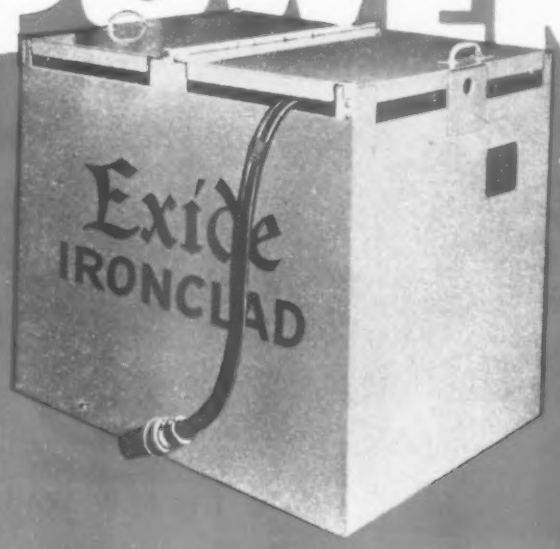
Mr. Lange pointed to the tremendous drive towards mechanization of ferrous and nonferrous foundries during the last few years. Although the war was quite a factor, Mr. Lange gave credit to the automotive industry for the present trend towards mechanization more than any other single industry.

He added that competition for man-

(*Continued on page* 172)

AUTOMATIC FORK TRUCK

DEPENDABLE POWER



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Wherever goods are lifted, hauled and stacked, efficient battery electric trucks and Exide-Ironclad power are effecting important economies all along the line. They do more work per man per hour and at less cost. They do it with greater ease and safety. And they maintain a steady pace straight through to the end of every shift.

Exide-Ironclad Batteries have the high power ability, the high maintained voltage and the high capacity that materials handling demands. You can always count on Exide-Ironclad Batteries for dependability, long-life and ease of maintenance.

Write us for a FREE copy of Exide-Ironclad Topics which contains "Case Studies" of materials handling problems. It tells how to cut handling costs up to 50% . . . covers latest developments in handling materials from receiving to shipping.

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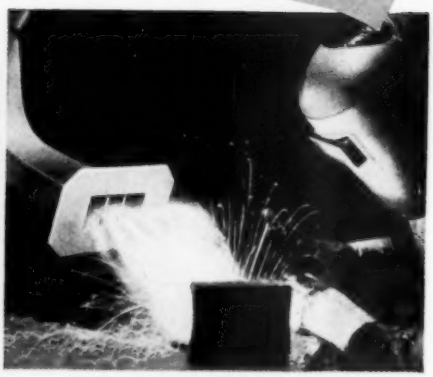
Why the RUEMELIN FUME COLLECTOR *is a* REAL NECESSITY

● *THE OLD WAY*



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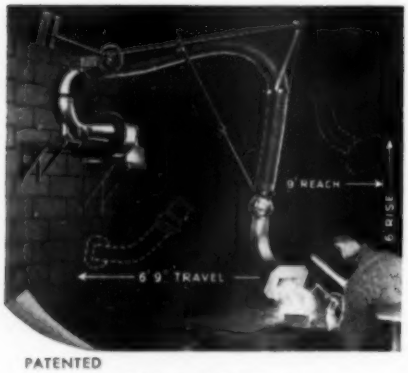

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- Long reach Model D-5342 — ideal for large welding booths; reaches out 15 feet from wall.
- Standard Model D-5310—used for standard welding booth ventilation; hood reaches out 9 feet from wall.

The Ruemelin Welding Fume Collector has been specially engineered to eliminate noxious fumes. The inlet hood maintains a constant high velocity over the working area, quickly removing heat and smoke *at the source.* Welders equipped with this device are assured of a clean shop atmosphere; the manufacturer gains by increased daily production.

The fume collector hood instantly placed where needed anywhere in the booth welding area. No tedious adjustment necessary. Approved by state industrial commissions and by compensation insurance companies. Over one thousand in satisfactory service. Many repeat orders. Write for Bulletin No. 37-C today. Free engineering service on all installations.

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Manufacturers and Engineers of Sand Blast and Dust Collecting Equipment

(*Continued from page* 170)

power has also been a factor in mechanization. In the early days of foundries there was a plentiful supply of foreign labor, but this supply has been shut off. American labor is much more exacting and particular about surroundings and working conditions.

Foundry publicity during the war was bad but true, according to Mr. Lange. This criticism awakened the foundry industry to the realization that a foundry must be made a good and desirable place in which to work— one to which engineers and technicians as well as competent labor can be attracted.

He went on to say that every foundry can improve its conditions and thereby its competitive position to a certain extent, but complete mechanization of every foundry is not feasible. It is easy to mechanize foundries of every size, but it is not so easy to reduce cost sufficiently in a small foundry to make the investment a paying proposition. Any installation, to be a good investment, should pay for itself within 2 to 3 years, in Mr. Lange's opinion.

He concluded his talk by showing a group of slides showing foundries that are operating with highly mechanized systems.—*J. W. Costello.*

Michiana

MICHIANA Chapter of the AFA had one of the year's best meetings March 4 at the Elkhart Hotel, Elkhart, Ind. Many chapter members took advantage of the invitation of Elkhart foundries to visit their plants. A reception committee headed by K. A. Nelson, Chicago Hardware Foundry Co., conducted tours during the afternoon.

Dinner was held during the evening with entertainment sponsored by the foundries. Officer and director nominations for the 1947 season were presented: For vice chairman, H. B. Voorhees and K. A. Nelson; for directors (four to be elected), F. McGuire, A. J. Edgar, L. Reife, William Fryer, K. Clark and William Lange Jr.; for secretary-treasurer, V. Spears.

Through automatic progression, this season's vice chairman, John Miller, becomes chairman for next year.

Speaker for the evening was J. B. Caine, chief metallurgist, Sawbrook Steel Castings Co., Cincinnati; his subject was "What Do We Know About Sand?" Aided by slides, the speaker brought out points and expressed definite opinions as to the practices required with sand in order to produce better castings.

Mr. Caine made comparisons in the uses of southern and western bentonite. He stressed the importance of proper amount of moisture in sand; submitted

(*Continued on page* 174)

More grinding . . . done faster! That's the story of Simonds Abrasive high speed resinoid bonded grinding wheels . . . especially efficient for rough snagging work in foundries and steel mills where fast stock removal at reasonable cost is the prime consideration.

Also used for high speed abrasive cutting-off operations and many precision finishing jobs such as roll grinding, saw gumming, disc grinding and surfacing with segments.

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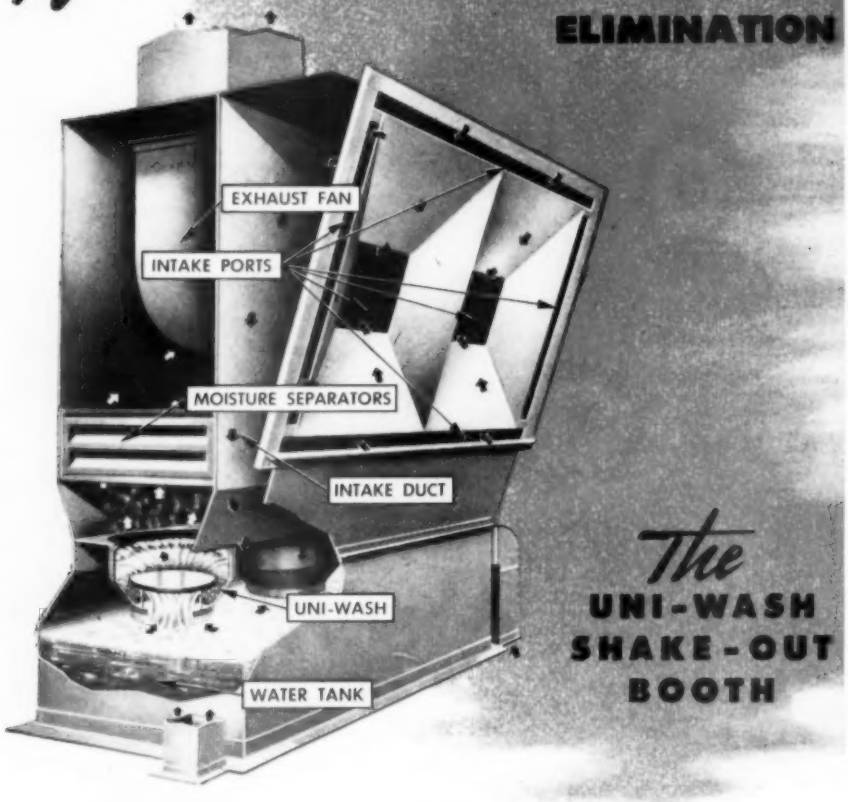
New EFFICIENCY, ECONOMY in DUST ELIMINATION



The UNI-WASH SHAKE-OUT BOOTH

COLLECTS, PURIFIES, EXHAUSTS FOUNDRY AIR— *within one unit!*

The Uni-Wash Shake-Out Booth is a complete conditioning system for foundry air . . . delivered pre-assembled—factory tested. The only assembly required is connection of water, electrical services and discharge duct. Uni-Wash process collects dust as wet sludge which is carried to disposal point by automatic conveyor. No nozzles, piping or suction pump to clean, maintain. Only clean dry air reaches exhaust fan . . . no fan impeller replacement. Entire unit occupies less floor space and costs less than any system of comparable capacity.

THE UNI-WASH PROCESS

The Uni-Wash Process multiple-washes air, then thoroughly scrubs it. Exhaust fan suction draws a large volume of water and air up into the cone where it impinges against a disc baffle plate with violent force and ricochets to the wall of the cone. This produces a horizontal curtain across the opening between the baffle plate and the cone. When the water strikes the wall of the cone, it splashes violently into the air stream, then falls by gravity onto the angular wall below. From here it flows into the tank in sufficient volume to produce a heavy water curtain around the bottom of the cone.

Thus, the air is first washed as it is drawn through the vertical curtain. Following upward with the water column, it impinges against the baffle plate. The final wash occurs as the air passes through the horizontal curtain. The air now enters moisture separators for thorough scrubbing. As the air enters the exhaust fan, it is clean and free of water.

PATENT NO. 2380065

Established 1912

NEWCOMB-DETROIT COMPANY

5741 Russell Street • Detroit 11, Michigan

(*Continued from page* 172)

analysis of causes of adhesion of sand to castings, usually referred to as burned on, when in reality such sand can be considered as mechanically locked on the casting.

B. J. Stressle, general foreman, Peru Foundry Co., Peru, Ind., was inducted into the chapter as a personal-affiliate member. He was sponsored by H. B Voorhees.—*Stanley F. Krzeszewski, publicity chairman.*

Canton

ONE hundred and four members and guests attended the Mar. 20 meeting of the Canton District Chapter of the AFA at Portage Hotel, Akron, O. The meeting was in the form of a round-table discussion with a board of "experts" to answer questions.

Members of the board were C. B. Williams, Massillon Steel Castings Co., Massillon, O.; Charles Reyman, Atlantic Foundry, Barberton, O.; H. G. Stevener, American Steel Foundries, Alliance, O.; George M. Biggert, United Engineering & Foundry Co.; M. G. Winters, Winters Foundry & Machine Co., and E. R. Daugherty, Stark Pattern Co., all of Canton.

Nominations of officers and directors of the chapter for next year were presented by C. E. Shaw, American Steel Foundries, chairman of the nominating committee. Secret ballot by mail will precede the April meeting when election results will be announced.—*Nils E. Moore, chapter reporter.*

Wisconsin

NOMINATING committee of the Wisconsin Chapter of the AFA presented its officer and director selections for the 1947 season at the regular dinner meeting March 14.

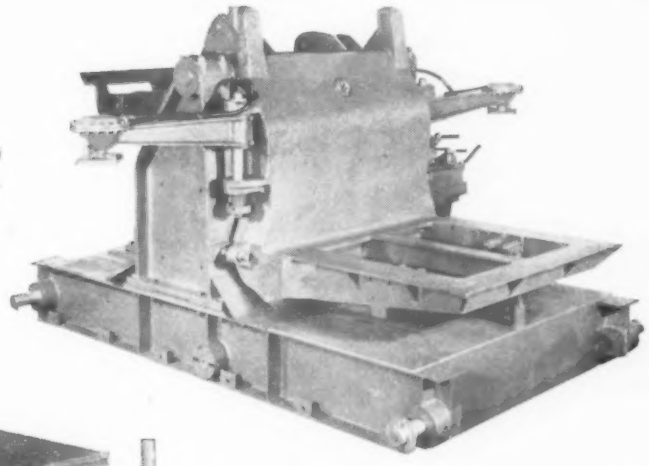
Officer nominees are: President—R. J. Anderson, works manager, Belle City Malleable Iron Works, Racine, Wis.; vice president—Robert C. Woodward, chief metallurgist, Bucyrus-Erie Co., South Milwaukee; secretary—Arthur C. Haack, vice president, Wisconsin Gray Iron Co., Milwaukee; treasurer—Richard F. Jordan, vice president, Sterling Wheelbarrow Co., Milwaukee. Directors for terms expiring in 1950 are: Walter Edens, metallurgist, Ampco Metal Inc.; A. F. Pfeiffer, assistant general superintendent, Allis-Chalmers Mfg. Co. and Joe G. Risney, Risney Foundry Equipment Co., all of Milwaukee.

L. P. Robinson, director of the core oil sales division, Werner G. Smith Co., spoke on "Variables in the Core Room—What Are You Doing About Them?" It

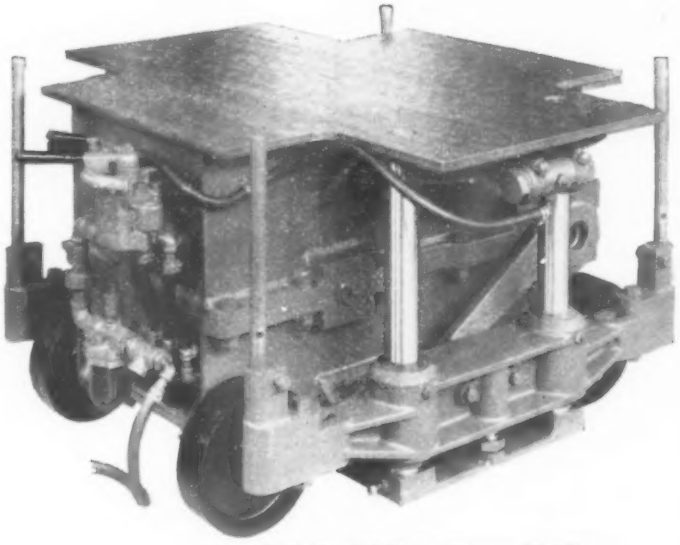
(*Continued on page* 179)

SPO Molding Machines

PROMOTE *Production-with-Accuracy*



Special portable SPO No. 2340 Rockover Draw Machine for large, slinger-rammed drag molds.



SPO No. 012 Plain Stripper Molding Machine for cope molds—a companion machine to No. 2340.

Since you want accurate molds, you insist upon using good patterns, flasks and molds. Unaided, however, these essentials cannot give you maximum production with accuracy. You need also *the right molding equipment* . . . Investigate SPO Molding Machines. You will find them fast, versatile, very low in cost of operation and maintenance, giving you *molds true to pattern*—and plenty of them. These advantages spring from a thorough-going simplicity of design and rugged, trouble-free construction.

MEMBER

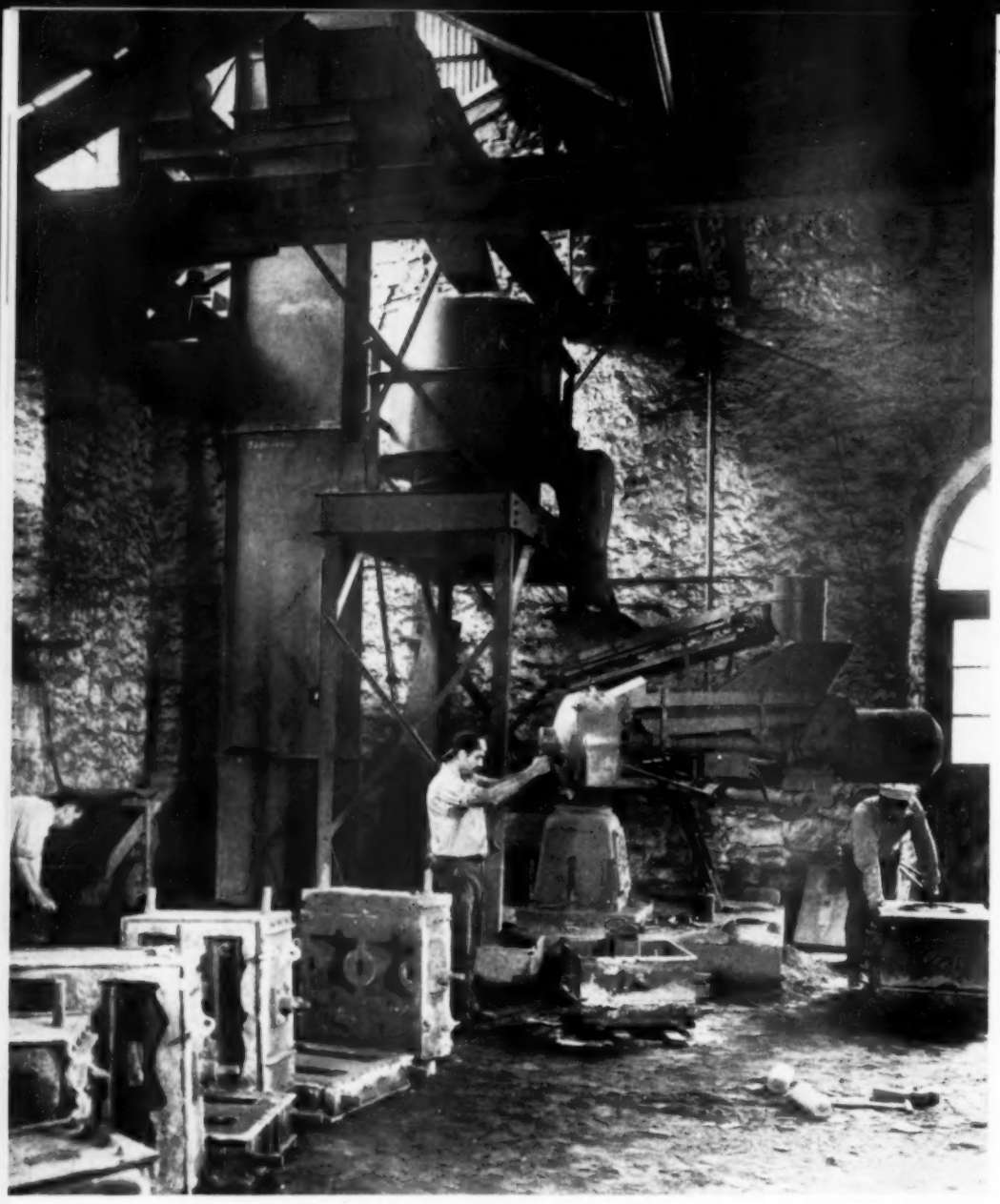
Bulletin gladly supplied on request

SPO

INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE • • CLEVELAND 5, OHIO



A Condensation of an Article from The Beardsley & Piper Company's BETTER METHODS

●With the same number of man hours and without additional floor space, Fisher & Norris doubled their mold output! How? With a most simple sand system—a Screenarator, an elevator, a B & P Plate Feeder, and a Stationary Sandslinger!

So You have a *Small* Foundry

A Small 100 Year Old Foundry Modernizes

Fisher & Norris double their output with A Stationary Sandslinger

Fisher & Norris, Eagle Anvil Works, Trenton, N. J., have a small 100 year old foundry. Small and old, yes, but modern and efficient in its operation.

For many years, before their new B & P equipment was installed, sand was shaken out on the floor where the molds were poured and the sand cut by hand, then put through an electric riddle. The molding floors were laid out in a circle around each of the job cranes and sand was arranged in a

(continued on next page)

● Fisher & Norris foundry. Small, but efficiently operated, they now pour two heats per week instead of one... proving there's no foundry too small for a Sandslinger.

(continued from previous page)

circular heap. Flasks were also placed in the circle and the molders rammed the molds by hand.

Now, the sand is shaken out near a Screenarator (at left in large photo). It is easily shoveled into the Screenarator where it is thoroughly screened, cleaned and aerated. The Screenarator is so located that the prepared sand is thrown directly from it into the boot of a bucket elevator which discharges it into the 3-ton storage bin of a plate feeder. The plate feeder, with push button control located at the operator's finger tips on the Sandslinger head, supplies sand as needed to the "Slinger."

● *Production on these anvils has doubled because of the Sandslinger's fast, uniform ramming.*

The Stationary Sandslinger rams all of the molds. Now, with hard, uniform Sandslinger ramming, gaggers and center bars have been eliminated. Because of better sand preparation with the Screenarator and harder, more uniform ramming with the "Slinger," high quality castings are produced without the use of facing sand, formerly used, and with a reduction in scrap losses to 2%. This new equipment has enabled Fisher & Norris to more than double their output with the same amount of floor space.

There's no foundry too small for a Sandslinger. Properly installed, properly used, it is the most versatile and efficient machine in the foundry.

THE BEARDSLEY & PIPER CO.
2424 N. Cicero Avenue, Chicago 39, Illinois

PREPARES... CONVEYS... AND RAMS ITS OWN SAND

Foundries . . . Large and Small Use The Sandslinger

Sandslinger travels under its own power on rack rails laid in floor. Moves into sand heap piled between tracks, picks up and rams sand in one operation.

TRACTOR TYPE SANDSLINGER

A day's production is poured, molds are shaken out within track. Sandslinger is then reversed and prepares sand for next day's molding.

Exceptionally versatile, the Tractor Type Sandslinger is ideal for either production or jobbing foundries having no auxiliary sand handling equipment. Hundreds of foundries have found it to be the answer to their production problems. Write today for catalog which gives complete information.

THE BEARDSLEY & PIPER COMPANY

General Offices: 2424 N. Cicero Avenue • Plant: 2541 N. Keeler Avenue
CHICAGO 39, ILLINOIS

It's a B&P Product! Sandslinger • Speedslinger • Speedmullor • Screenarator Mulbaro • Sand Conditioning Machine • Champion Speed-Draw

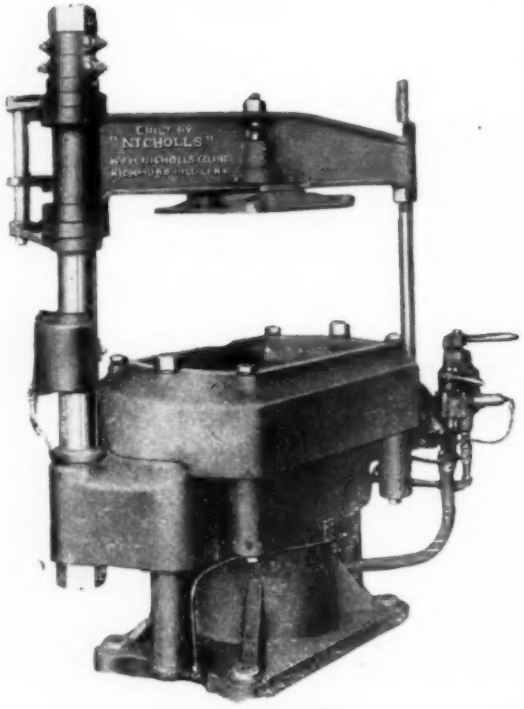
IMPROVED
HEAVY-DUTY
MOLDING MACHINES
Jolt .. Squeeze and Pattern Draw

ACCEPTANCE

The international acceptance of large numbers of NICHOLLS Molding Machines for many years is evidence of their productive capacity combined with low upkeep and reliability. NICHOLLS design and construction is the basis of this reputation.

PRECISION BUILT

Pistons and Cylinders are finished ground to micrometer sizes. All draw pins and guide bushings are case hardened and ground to precision tolerances for perfect fit and smooth operation.



11-32 Type "D"
Shown with Parallel Self-Positioning Squeeze Head

AUTOMATIC CONTROLS

These machines can be equipped with Push Button Control for all operations, including jolt and squeeze timing.

ALIGNMENT

The one piece heavy base and cylinder castings with integral supports for uprights, guide pins, bushings and valve brackets assures rigidity and permanent alignment.

LOW UPKEEP

For satisfactory performance over extended periods, dirt proof housings and forced lubrication have been provided for all parts that might otherwise wear quickly; thereby assuring low upkeep costs.

Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL 18, LONG ISLAND, NEW YORK

ESTABLISHED 1910

Foreign Manufacturers and Selling Agents—

For Continental Europe and Great Britain—The George Fischer Steel and Iron Works, Schaffhausen, Switzerland.

NICHOLLS

(*Continued from page* 174)

was an instructive talk based on his experiences in calling on foundry officials. According to Mr. Robinson, most core troubles are the result of inexperienced help and change in sand and other ingredients.

He gave a supplementary talk, describing his personal experiences in raising poultry, which kept the crowd roaring.

Announcement was made that the chapter will again honor the old timers and apprentices at the regular meeting May 9.—*John E. Hubel.*

Western New York

FOUNDRYMEN of ancient times must have exercised the greatest perserverance against obstacles and heartbreak to achieve the results of which we have record, AFA National Director B. L. Simpson, National Engineering Co., Chicago, told modern foundrymen at the technical session of Western New York Chapter of the AFA, Mar. 7 at Hotel Touraine, Buffalo.

Mr. Simpson reviewed "The History and Development of the Foundry Industry," presenting numerous slides to demonstrate the progress in the art of casting metals. Beginning with the first metals (copper and gold) to be worked by man as early as 8000 BC, Mr. Simpson related an interesting story of progress in metals from the days of the Greeks and Romans down through the Renaissance Period.

Large and intricate castings were produced in a day when foundrymen did not have the benefit of modern scientific knowledge, equipment or instruments, according to Mr. Simpson, yet those castings surviving are works of art.—*Leslie C. Thellemann, publicity chairman.*

Pittsburgh

THE MAR. 17 meeting of the Pittsburgh Foundrymen's Association was held at Fort Pitt Hotel with appropriate festivities in keeping with St. Patrick's Day. Frank G. Steinebach, editor of THE FOUNDRY, addressed the group on the influences which were brought to bear on the foundry industry since the beginning of the war and effect of those influences in the years immediately ahead.

Mr. Steinebach pointed out that one of the major lessons foundrymen should have derived from war production experience was that the fortunes of one branch of the foundry industry are interwoven with the success of all other branches. Production of castings continues a single industry, and the success of this industry in supplying the needs of the nation demands the co-operative efforts

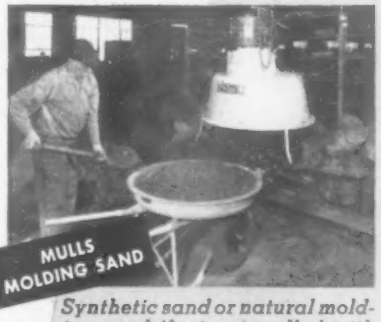
Low Cost Mulling!

the MULBARO

IT'S REALLY PORTABLE

• Here's the *only* portable mullor—the *only* versatile mullor! Ideal for regular or special batches in a small or large foundry. Low initial cost—economical in operation!

Available in two sizes—3½ cu. ft. and 7 cu. ft. batch capacity.



Synthetic sand or natural molding sand (facings) mulled with efficiency and thoroughness.

Core sand uniformly mixed with oils—then wheeled direct to benches

JUST fill the Mulbaro's barrow with sand and lower the mulling mechanism—the rubber-covered mullor wheels and steel plow assembly have proven to provide the ultimate in distribution of additions and mulling results. A real mulling job done fast, at lowest cost. When mulled, the sand is in its container, ready for delivery. Write for catalog.

THE BEARDSLEY & PIPER COMPANY

General Offices: 2424 N. Cicero Avenue Plant: 2541 N. Keeler Avenue
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IT'S A B&P PRODUCT! SANDSLINGER • SPEEDSLINGER • SPEEDMULLOR • MULBARO • SCREENARATOR • SAND CONDITIONING MACHINE • CHAMPION SPEED-DRAW

WHEN HE POURS

Protect against costly core blowing losses with **BUFFALO BRAND VENT WAX**

Choice of Foundries for Over 35 Years

Buffalo Brand
VENT WAX

UNITED COMPOUND COMPANY
328 South Park Ave., Buffalo 4, New York

of all kinds of foundries. Recognition of this fact has resulted in the recent formation of the National Castings Council.

He went on to say that the day undoubtedly will come again when the various branches of the foundry industry will have to compete for orders not only among themselves but with other methods of fabrication and with other materials. Every production effort must be made to meet customers' manufacturing schedules, and special attention must be given to manufacturing a uniform product from hour to hour and from day to day in each foundry.—*Joseph C. Sullivan.*

Central New York

APPROXIMATELY 60 members and guests of the Central New York Chapter of the AFA heard Ralph R. Meigs, assistant vice president, loss prevention department, Liberty Mutual Insurance Co., Boston, discuss "Safety in the Foundry," March 14 at the Onondaga Hotel, Syracuse, N. Y.

Mr. Meigs outlined a four-point program for accident prevention: 1. Create a broad conception of the value of accident prevention. 2. Organize to produce accident prevention. 3. Tackle material handling jobs from a safety standpoint. 4. Do a better job of housekeeping.

Safety, according to Mr. Meigs, must not be considered a minor undertaking, but must be viewed as a broad activity having to do with better utilization of manpower, welfare of workers, improvement of industrial and public relations, and a broad, overall task for management and personnel. Accident prevention is a major factor in getting and maintaining good working conditions and high productivity. Safety is the must that goes with the slogan, "The foundry is a good place to work."—*J. A. Feola, publicity chairman.*

Northwestern Pennsylvania

REGULAR monthly dinner meeting of the Northwestern Pennsylvania Chapter of the AFA was held at the Moose Club, Erie, Pa., Mar. 24.

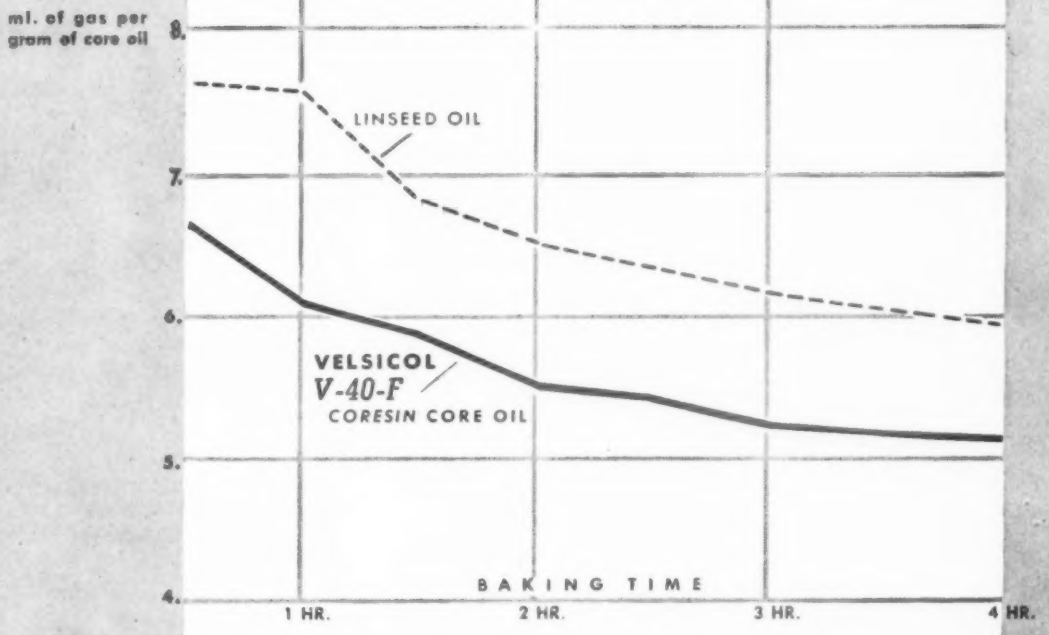
Approximately 60 members and guests heard Tom E. Barlow, Battelle Memorial Institute, present an interesting talk supplemented with slides to demonstrate the effect of careful inoculation of gray iron. Inoculation was presented as a tool for the foundryman to improve casting characteristics without altering the chemical analysis of the melt.

Officer and director nominees presented at this meeting were: Chairman John W. Clarke, General Electric Co., Erie; vice chairman J. S. Hornstein,

(*Continued on page* 182)

Highest STRENGTH-TO-GAS RATIO

VELSICOL V-40-F Coresin Core Oil



The above curves were obtained by using 50 mesh washed and dried silica testing sand with 1% of oil and 2% moisture. The test cores were baked in a recirculating type laboratory oven and they developed comparable tensile strengths with each oil. The test specimens were burned in their own atmosphere for 1 minute at 1900° F.

Tests conducted in several foundry laboratories have shown that, without an exception to date, Velsicol V-40-F Coresin Core Oil develops the highest strength-to-gas evolution ratio of any core oil.

The small amount of core gas produced by the combustion of Velsicol V-40-F Coresin Core Oil film is reducing in character and is conducive to smooth, clean casting finish.

For unexcelled workability in your core boxes, high binding strength, lowest gas-evolution and maximum economy in the production of high-grade castings in steel, gray-iron, malleable or non-ferrous metals use Velsicol V-40-F Coresin Core Oil in your core room.

VELSICOL Corporation

Manufacturers of: Coresin Core Oils • Aromatic Solvents • Synthetic Resins • Insect Toxicants

General Offices: 330 East Grand Avenue, Chicago 11, Illinois

F. F. Pearles Co., R. F. D. No. 1, Detroit, Mich. • W. A. Zeis, St. Louis, Mo. • Foundry Supply Co., Inc., St. Paul 4, Minn. • H. S. Stoller & Co., Akron, Ohio • Manufacturers' Equipment & Supply Co., Chattanooga 2, Tennessee • Wilson Industries, Cambridge 42, Massachusetts

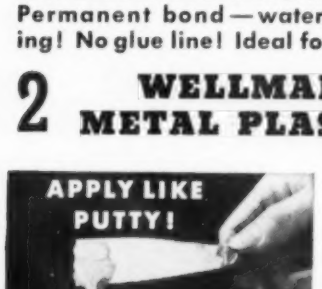
New Time Savers for Building Up Patterns

Here are four exclusive Wellman products to save labor and cut costs in both wood and metal shops.

1 LIQUI-PLASTIC GLUE

The amazing super strength wood glue—ALL OF THE ADVANTAGES with none of the bother of hot glue. Permanent bond—water resisting! No glue line! Ideal for fillets.

2 WELLMAN METAL PLASTIC



For filling blow holes, screw holes, etc. in metal patterns and castings. Applied cold like putty. Quickly hardens like solder. Can be filed!

3 CELASTIC COLLOID-TREATED FABRIC FOR LAGGING

Build-up patterns by adding 1/64" thickness or more. Handles like wet felt. Hardens and works like wood. Self-bonding.

4 WELLMAN PATTERN PLASTIC

For minor repairs, dents, gouges, etc. in wood. Can be planed, sanded, shellaced or lacquered. Does not dull tools. Apply like putty.

Write for prices and samples of Wellman Plastic Materials!

The **WELLMAN PRODUCTS** *Company*

E. 49th at SUPERIOR
CLEVELAND 3, OHIO

PATTERN SHOP SUPPLIES, TOOLS, EQUIPMENT

Manufacturers of

Brass and Steel Dowel Pins, Steel Core Box Pins and Bushings, Tapered Spindles for Sanders, Pattern Letters and Foundry Marks, Special Screw Machine Products, Magnesium and Aluminum Pattern Plates

(*Continued from page* 180)

Meadville Malleable Iron Works, Meadville, Pa.; secretary Harry L. Gebhardt, United Oil Mfg. Co., Erie, and treasurer Joseph A. Shuffstall, National-Erie Corp., Erie.

Nominees for director with terms expiring in 1950 are: Bailey Harrington, Hickman Williams & Co., Erie; Herman Zwicker, American Sterilizer Co., Erie, and Frank Volgstadt, Griswold Mfg. Co., Erie. J. Douglas James, Cooper-Bessemer Co., Grove City, Pa., was nominated to replace Mr. Shuffstall as director and Earl M. Strick, Erie Malleable Iron Co., Erie, the retiring chairman, was nominated to a one-year term.

Entertainment in the form of a boxing exhibition was furnished by eight boys from the Erie Boys' Club.—*John E. Gill.*

Metropolitan

MEMBERSHIP in the American Foundrymen's Association has reached a new high of 9000, William W. Maloney, secretary and treasurer of the organization, Chicago, told members of the New York Metropolitan Chapter at their National Officer's Night meeting at the Essex House, Newark, N. J., Mar. 3. The association now has 36 chapters, including two in Canada and one in Mexico, with the latest, the Tri-State Chapter, Tulsa, Okla., formed Feb. 28. Mr. Maloney complimented the local chapter on attaining a new peak in its membership—375 members as of Jan. 1.

Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., AFA national vice president, and William Wallis, Pittsburgh Lectromelt Furnace Corp., Pittsburgh, and national vice presidential nominee of AFA, spoke briefly.

Speakers at the technical session on foundry sands were: R. J. Maddison, Whitehead Bros. Co., New York; George F. Pettinos, George F. Pettinos Inc., Philadelphia; J. W. Mentzer, Taggart & Co., Philadelphia; and H. J. Williams, New Jersey Silica Sand Co., Millville, N. J.

Discussing Albany sand, Mr. Maddison said that it has been in continuous production for more than 100 years and has various valuable inherent properties, such as flowability, peel from casting and low expansion and contraction grains.

Mr. Pettinos confined his remarks to New Jersey bonded sand, discussing properties of the sands produced in the Millville, Mt. Holly and Grenlock districts. Each, he said, has a place in the foundry, depending upon the work to be done.

Confining his brief remarks to gravel, Mr. Mentzer warned buyers not to add too many other ingredients. Gravel

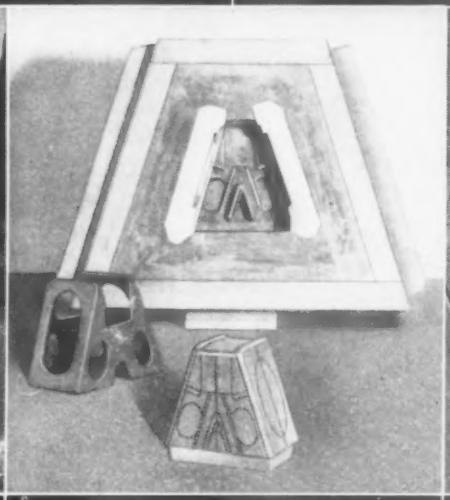
(*Continued on page* 184)

How HYDROCAL Helps Patternmakers

Hydrocal * is ideal for the "booking" method which simplifies checking a core box having no part of entry.

Dimensionally stable, non-warping Hydrocal pattern stock (of predetermined thickness) fabricates easily, quickly.

Template-formed Hydrocal shapes can be combined and blended to make master patterns rapidly and accurately.



In making cores and core boxes, Hydrocal eliminates many templates, assures perfect match between core print and box.

Hydrocal follow boards are accurate, easily and quickly made; provide needed support for thin patterns.

ONE or more of these modern methods shown above can help you in your pattern shop now!

First, send for bulletins describing and illustrating uses of Hydrocal . . . *learn* about these super-strength gypsum cements.

Then *try* this versatile material on your jobs and *prove* to yourself how it performs.

*Hydrocal is a trademark Reg. U. S. Pat. Off. for a super-strength Gypsum Cement manufactured by United States Gypsum Company.

Free!

Mail Coupon NOW For LATEST BULLETINS

UNITED STATES GYPSUM COMPANY
Dept. F-5-47, Chicago 6, Illinois

Gentlemen: Please send me copies of your latest bulletins as checked below.

- ☐ IGL-103, How to Make Pattern Stock with Hydrocal
- ☐ IGL-104, How to Check a Core Box with Hydrocal
- ☐ IGL-105, How to Make a Hydrocal Follow Board
- ☐ IGL-106, Hydrocal Combined and Blended Shapes
- ☐ IGL-107, How to Make a Core Box with Hydrocal

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United States Gypsum

For Building • For Industry

Gypsum • Lime • Steel • Insulation • Roofing • Paint

SMALL FOUNDRY POURS 12,000 THREADING DIES WEEKLY FROM *DETROIT ELECTRIC FURNACE*

TYPE LFN, 150 KW, 500 LB. NOMINAL CAPACITY
DETROIT ELECTRIC FURNACE MELTING GRAY IRON

TIME CHART

A typical Day's Operation: No. of Heats, 8; No. of Hours, 8½; Total Weight, 3,600 lbs.; Weight per Heat, 450 lbs.; Total Power Consumption, 1066 KWH; Power per Ton, 592; Melting Time/Heat, 48 minutes

A bottleneck that curtailed *production* of small castings, poured at high temperatures, was *quickly broken* at a manufacturing plant in northeastern Pennsylvania with a *fast melting* DETROIT ROCKING ELECTRIC FURNACE. The company established their own 7-man foundry, installed a Type LFN, 150 Kw., 500 lb. capacity DETROIT ELECTRIC FURNACE—and now they're melting 450 lb. heats of gray iron to pour 12,000 castings per week. Daily *power consumption* averages 1050 Kw hours or 590 KWH per ton. *Melting time* is 48 minutes per heat. Metal is of *higher* and more uniform *quality*, because the one-man controls on the Detroit Electric Furnace consistently maintain high pouring temperatures desired—2900°F.—and afford constant regulation of *melting time, composition,* and other *melting factors.*

The furnace shell of a DETROIT ELECTRIC FURNACE is easily removed, and in the event of a burned out lining a spare, previously lined, shell can be installed with only a brief interruption of production. DETROIT ELECTRIC FURNACES are made in various sizes and capacities. Send us your production requirements and our engineers will recommend the specific model designed to speed melting of ferrous and/or non-ferrous metals in *your plant.*

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

(*Continued from page* 182)

properly used, in accordance with the best advices of the sellers, will result in few complaints about gravel, he emphasized.

Mr. Williams, with the aid of lantern slides, outlined modern methods for producing silica sands. He pointed to the great strides that have been made the last 25 years and to the variety of analyses that can now be obtained, all closely worked out as a result of laboratory tests.—*Ben K. Price.*

Northeastern Ohio

PATTERNMAKING Division of the Northeastern Ohio Chapter of the AFA sponsored the program at the chapter's regular dinner meeting at the Cleveland Club, Cleveland, Mar. 13.

Frank Cech, Cleveland Trade School, and chairman of the Patternmaking Division, spoke on "A Patternmaker's Viewpoint." He set forth some of the aims of an AFA chapter composed of foundrymen and patternmakers. Some of the objectives he mentioned were: Stimulate and increase interest in meetings by having speakers for each group; promote better contacts, both social and business, promote closer co-operation between foundrymen and patternmakers; discuss apprentice training and set up programs to provide for this training in foundries and patternmaking shops; promote trade schools; create interest in co-operative school programs, and seek better production methods.

Following the talk, Norman Wagner, one of Cleveland's well known amateur photographers of wild life, showed a color movie film entitled "A Trip to the Great North Country." This was an interesting picture of big game hunting, fishing and outdoor life in the Yukon territory.—*Robert H. Herrmann.*

Central Indiana

NATIONAL Officers Night and Annual Joint Ferrous and Nonferrous meeting of Central Indiana Chapter, AFA was held March 3. V. A. Crosby, metallurgist, Climax Molybdenum Co., Detroit, spoke before the ferrous group on "Factors Affecting the Physical Properties of Gray Iron."

To meet all requirements of the finished casting a number of factors must be considered. Among the first to be considered are design and choice of materials. Then, correct tensile strength must be chosen for the finished product, and Mr. Crosby explained how tensile standards have been set up.

With the aid of slides, Mr. Crosby explained that the modulus of elasticity is definitely related to the amount of

(*Continued on page* 186)

LOOKING FOR "FIRM PRICES"?

OUR management recently said, "Let's stop worrying about restless prices, and whether it's a buyer's or seller's market. Now, as always, there's only *one* kind of market . . . *customer's* market."

Take price quotations. In recent years, we, like most business, inserted the "escalator clause" as a means of protection against loss from rising prices. Inequitable? Sure. Only the seller was protected. The customer-buyer (most important half of *every* sale *any* time) stood unfairly exposed. What's more, this general practice contributed nothing toward price stability in the market-place. In fact, it bred instability.

But, even though the price horizon is still beclouded—even though we might well find ourselves underwriting further price increases, Tabor now chooses to switch back to a sound pricing fundamental. Effective May 1, 1947, we will quote "firm prices" on our entire line, embracing molding machines and allied foundry equipment.

We believe our decision conforms with a principle in good business, for all business.

REPRESENTATIVES

Snyder Foundry Supply Company, Los Angeles, California; Gallagher Foundry Supply Company, San Francisco & Oakland, California; Carl F. Miller & Company, Seattle, Washington; M. W. Warren Coke Company, 1017 Olive St., St. Louis1, Mo.; E.R. Frost Co., Inc., Minneapolis 14, Minn.

FOUNDRY EQUIPMENT MANUFACTURER'S ASSOCIATION INC.

The TABOR *Manufacturing Co.*

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES

6225 TACONY STREET • PHILADELPHIA 35, PENNA.

★ "PRODUCTION WILL LOWER PRICES . . . LET'S GET BACK TO WORK" ★

OUST LOAFING FANS

EFFICIENT PROPELLAIRS DO A REAL JOB OF MOVING AIR

Lazy fans just "fan the air," but Propellair fans get down to work and *move* it. You get *maximum* air movement with *minimum* horsepower—and that's what counts, because it means *operating efficiency.* Fans that deliver only from the blade tips—or push the air with single-action blades—waste power and space that you can save with Propellair airfoil-section fans.

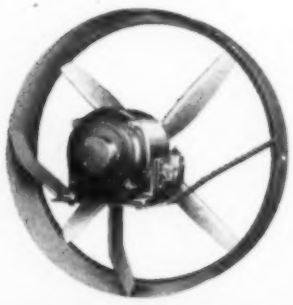
AIRFOIL PRINCIPLE MEANS MORE AIR MOVEMENT

Airfoils are surfaces with curvatures scientifically designed to give a lift, or thrust, reaction. Utilizing this principle, Propellair engineers have developed fan blades with varying thickness, which *pull even more air* than they push—distribute the load *evenly* from hub to blade tip. Because of this *double-action* performance, you get high volume, uniform velocity, axial flow output over the whole fan area.

High-speed tip-section has least camber (curvature of blade surface), least chord (width of blade section), and least pitch (angle of attack).

Medium-speed mid-section has gradually increasing chord and pitch; gradually more camber.

Low-speed hub-section has greatest camber; highest pitch.



HEAVY-DUTY FANS FOR FOUNDRIES

Illustrated, the Type CD direct-connected Propellair for walls, windows, ducts, hoods, roofs. Sizes: 12 to 60 inches. Capacities to 88,000 c.f.m. Other Propellairs available for every foundry need Types include shaft and belt drive models for ducts or stacks, with motor outside airstream; portable fans on cradle or pedestal mountings; and Verti-Stack power roof ventilators. Write for full information.

PROPELLAIR

DIVISION OF ROBBINS & MYERS • INC.

SPRINGFIELD • OHIO

(*Continued from page* 184)

graphite in the casting. Slides and photographs also were used to show how the matrix structure and strength are related.

Lower carbon cast iron will give a higher tensile, higher transverse strength, higher hardness and the same deflection as that of a somewhat higher carbon cast iron. He added that finished casting strength may be improved by the use of late additions of silicon, or by an increase in the amount of superheat. —*Jack W. Giddens.*

Southern California

AT THE Apr. 4 meeting of the Southern California Chapter of the AFA, held at Roger Young Auditorium, Los Angeles, William E. Daugherty, manager of the West Coast Refractory Division, Laclede-Christy Co., L. H. Butcher Co., Los Angeles representatives, discussed refractory materials.

The more important refractory products used in industry today, said Mr. Daugherty, are silica-alumina, including fire clay, high alumina and sillimanite or kyanite. Others include acid or silica refractories, basic or magnesite, and natural or chrome refractories. Fire clays will stand temperature changes better than any others. Silicas will carry high temperature loads and resist acid slags. Chrome and magnesites are more refractory than fire clay and silica but have low resistance to spalling and low load bearing capacity at high temperatures.

In the question period after the talk it was brought out that bricks in the same lot are often of different colors. Color has little effect on life of the brick. Clays and other materials, even from the same strata or lot, are often of varying compositions that cannot be fully tested except by use. Mr. Daugherty also discussed ladle linings in this period. —*Maurice Beam.*

New Jersey

MEMBERS of the New Jersey Foundrymen's Association at their Mar. 24 meeting at the Newark Athletic Club, Newark, N. J., heard a fine address on "Current Trends in Industrial Relations Techniques" by A. S. Ormsby, director of industrial relations, Worthington Pump & Machinery Corp., Harrison, N. J.

Mr. Ormsby said that the trouble with most companies is that their labor policy has not been carefully worked out in accordance with sound principles but has been developed in haphazard fashion. The objectives of a sound industrial relations policy should be to improve the welfare, good feeling and

(*Concluded on page* 188)

EF

GAS FIRED, OIL FIRED and ELECTRIC FURNACES

will maintain your production schedules and cut your costs

● EF furnaces are available in sizes to meet any capacity requirement, and thus fit into and become an integral part of your production processes just like any other machine. Each installation is designed and built specially for the particular and individual requirement assuring the smooth and continuous flow of material, avoiding bottlenecks and delays.

Investigate the EF design—recognized for efficiency and economy in short cycle malleabalizing, and the heat treatment of steel, aluminum and magnesium castings,—and get the advantage of the many exclusive EF features that assure uniform temperature throughout the furnace, accurate heat control within the required limits, low maintenance, increased outputs, and uniform, low cost dependable operation.

EF

THE ELECTRIC FURNACE CO.

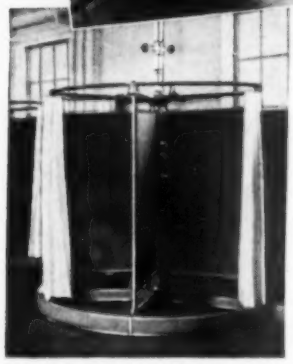
WILSON ST. AT PENNA. R.R.

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES
FOR ANY PROCESS, PRODUCT OR PRODUCTION

Salem-Ohio

INCREASE WORKER EFFICIENCY

By Providing Better Washrooms



Top illustration shows Bradley Washfountain.
Lower illustration, a typical space-saver Bradley Multi-Stall Shower installation.

COMPANIES SUCH AS THESE ARE INSTALLING BRADLEY WASHFOUNTAINS AND SHOWERS

American Car & Foundry
Milton Bradley
McLagen Foundry Co.
Brown & Sharpe
Chrysler (California)
Singer Mfg. Co.
Remington Arms
Heick Die Casting Co.
Pennsylvania R. R.
Shefford Hosiery Mills
Youngstown Sheet & Tube
Doehler Die Casting Co.
Swift
Pelton Steel Foundry
Simmons
Benrus Watch
Lake City Malleable
Electro-Motive
Acme Foundry
Ponemah Mills
Detroit Steel Castings
Arcade Malleable Iron Co.
Marrin Foundry
Badger Die Casting Co.
Sundstrand Foundry
Portland Foundry
International Harvester
Foundry Division, Ford
Foundry Division, Buick
Michiana Alloys
Allis-Chalmers
Elmira Foundry

MORE PLANTS ARE NOW

Installing Bradley Group Wash Fixtures

Records reveal that workers have a higher rating of efficiency and are more productive on a job where their personal conveniences are properly considered. In many instances, when adequate group washing facilities were installed, employee morale improved along with quality of work produced. Then too, better workers were attracted and turnover decreased.

Sanitary Bradley Washfountains allow your men to clean up thoroughly before leaving work. Workmen can wash to the waist in the clean *running* water from the central sprayhead and there's no delay because each Bradley comfortably accommodates from 8 to 10 persons at the same time. The deep, self-flushing bowl carries away the used water to prevent contamination. In addition to maximum sanitary advantages, Bradleys save space, eliminate numerous piping connections and cut water consumption by 70%. Multi-Stall Showers also offer the same comparable advantages and are available with receptors for installation on any kind of floor, including wood.

You'll find many other interesting and valuable facts about Bradley Washfountains and Multi-Stall Showers in Catalog 4701. Send for a copy today. BRADLEY WASHFOUNTAIN CO., 2217 W. Michigan Street, Milwaukee 1, Wisconsin.

BRADLEY *washfountains* AND *multi-stall showers*

Illustrated Catalog 4701 and Washroom Survey Sheet sent upon request.

(*Concluded from page* 186)

morale of the workers, to minimize friction between workers and management and thereby to obtain maximum production. It would be worth while to give as much time and attention to developing and administering a good industrial relations program as to customer relations, production, equipment or finance, he declared.

Some of the most important factors in good industrial relations are careful hiring specifications, checking references, selection for ability to produce and ability to get along with others without stirring up trouble; thorough training to teach good habits and eliminate bad habits learned in their shops; and foreman training.

Gerald Hannay, Barnett Foundry & Machine Co., Irvington, N. J., introduced the Rev. A. A. Monteiro, a former employee who had been assisted by the company in studying for the ministry, and had been ordained and was now conducting services periodically in several foundries. Rev. Monteiro gave a short but impressive talk.—*Ben K. Price.*

Detroit

ONE of the first detailed reports to be made public on work with chemically coated sand at Lynchburg Foundry Co., Lynchburg, Va., was presented at the Detroit Chapter's national officers' night dinner and meeting, March 20, by Max Kuniansky, vice president of the company and AFA vice president, in co-operation with T. J. Curry, metallurgist for the company.

Briefly, the process involves treatment of new sand with a water-soluble chemical known by the trade name Westonite which serves to provide a carbonaceous coating on each sand grain. Water to the extent of around 3 per cent is added and the mixture rammed into molds in conventional manner. Exceptionally good flowability of the treated sand results in high mold hardness, superior finish on the casting and good shakeout action.

Thus far the treatment has been confined to molding sands but a program is to be started leading to application to core sands.

Nominations for 1947-48 chapter officers were presented by E. C. Hoenicke, Eaton Mfg. Co., chairman of the nominating committee. Election will be held in May, with any further nominations considered at that time. The slate includes: Chairman, W. W. Bowring, Frederic B. Stevens Inc.; vice chairman, A. W. Stolzenburg, Aluminum Co. of America; secretary, R. E. Cleland, Eastern Clay Products Inc., and treasurer, George W. Fuller, Federal Foundry Supply Co.—*Charles J. Rittinger, chapter reporter.*

GRINDERS... ALL KINDS!

MOTOR DRIVEN — BALL BEARING

FOR VITRIFIED AND HIGH SPEED WHEELS.

SINGLE OR MULTIPLE SPEED.

Belted Motor Driven Grinders are Modern Tools. There is a greater clearance for the work in relation to the front of the machine and the face of the wheel.

Then, too, the ratio on the V-belt Drive permits providing the correct peripheral speed on either Vitrified or Resinoid Bond Wheels.

The Multiple Speed Machine allows for obtaining maximum wheel wear, lower wheel cost, higher production, all by maintaining the peripheral speed throughout wheel life.

The No. 30 Grinder illustrated at the upper right made in sizes of 5 H.P. for 18" wheels up to 15 H.P. for 30" wheels. Larger motors to order. The distance between wheels is 55" or 59".

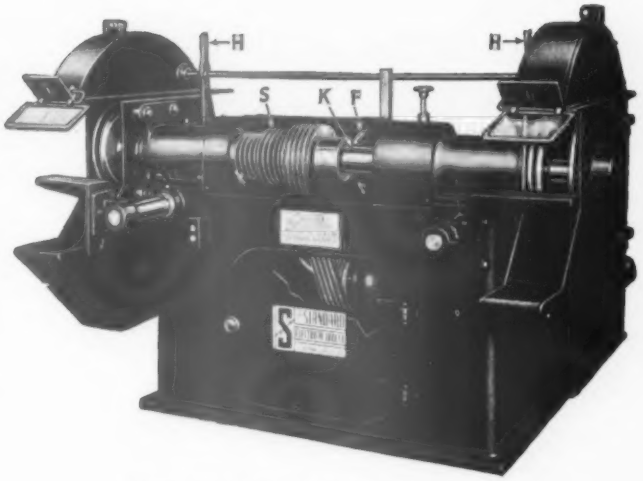
Type CD at lower right is a Pedestal Model Combination Grinder-Disc Grinder with Lever Feed Table. (Also available as a Double End (type DD) Disc Grinder. Sizes: 5 H.P. 18"; 5 H.P. 20" and 7½ H.P. 20" wheels.

EQUIPMENT on these two Grinders:

*Boiler Plate Steel Guards, adjustable to wheel wear.
*Multiple V-belt Drive.
*Ball Bearing Motors.
*Speed Control on Multiple Speed Grinders.

Optional:

Single Speed or Multiple Speed.
Flanges for large bore wheels.

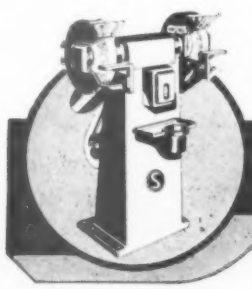


NO. 30 (30" 15 H.P. Illustrated)

TYPE 5CD (5 H.P. 18" Illustrated)

TYPE LG

The Type LG is a light weight Portable Grinder with 3 phase motor. The 12LG has a 1 H.P. motor for 6"x1" grinding wheel and weighs 28 pounds. The 18LG 1½ H.P. 7"x1½" wheel grinder weighs 33 pounds. **Delivery on 12LG from stock.**



Write for our Complete Catalog which describes "GRINDERS—all kinds!", from ½ H.P. to 30 H.P. Also a complete line of Disc Grinders. Long Distance phone Wabash 1677.

The STANDARD ELECTRICAL TOOL Co.

CINCINNATI · 4 · OHIO

2507 RIVER ROAD

The adventures of BILL

By PAT DWYER

Drawings by RICHEY

COMMENTING the other night on the recent convention in Detroit, Bill claimed that the only features he really enjoyed were a few miscellaneous and unrehearsed sessions where a number of the old boys with unerring instinct found a water hole or oasis in the desert and decided to linger in the vicinity for a brief or extended period, depending on whether the life-giving spring was working fast or slow. With no chairman or no rules of any kind to throw a sprag in the wheel of free discussion the comrades grabbed the figurative axe handle and laid into the work with right good will. They did not know or care where the chips fell. If occasionally a worthy brother voiced a protest, he was asked with more force than politeness if he wished to make something out of it. With all wraps off and no holds barred and yet in the best of good humor, pleasantries were exchanged in a style of language barred by all publications with the exception of the high class fiction in the best sellers.

"At one of these sessions," Bill said, "a scholarly gent swayed to his feet and asked for volunteers in a movement to instruct newspaper reporters in the meaning of certain words. He declared he became positively ill each time he came across the word 'shambles' either in a book or in a newspaper story. Anything in the shape of a wreck, from the tumble down shack in Athlone to the fall of the house of Usher, is referred to as a shambles, even where there is not a human being or any other living creature within 40 miles of the place. A single peep into any dictionary from the little vest pocket quickie to Webster's huge tome, which requires a dollie or a lift truck to move it from one place to another, would show any of these two-finger gents that a shambles is just another and presumably politer name for a slaughter house. A place where animals are killed and cut up for human consumption. A highly disagreeable place spattered with blood, and actively offensive to at least two of the senses, sight and smell.

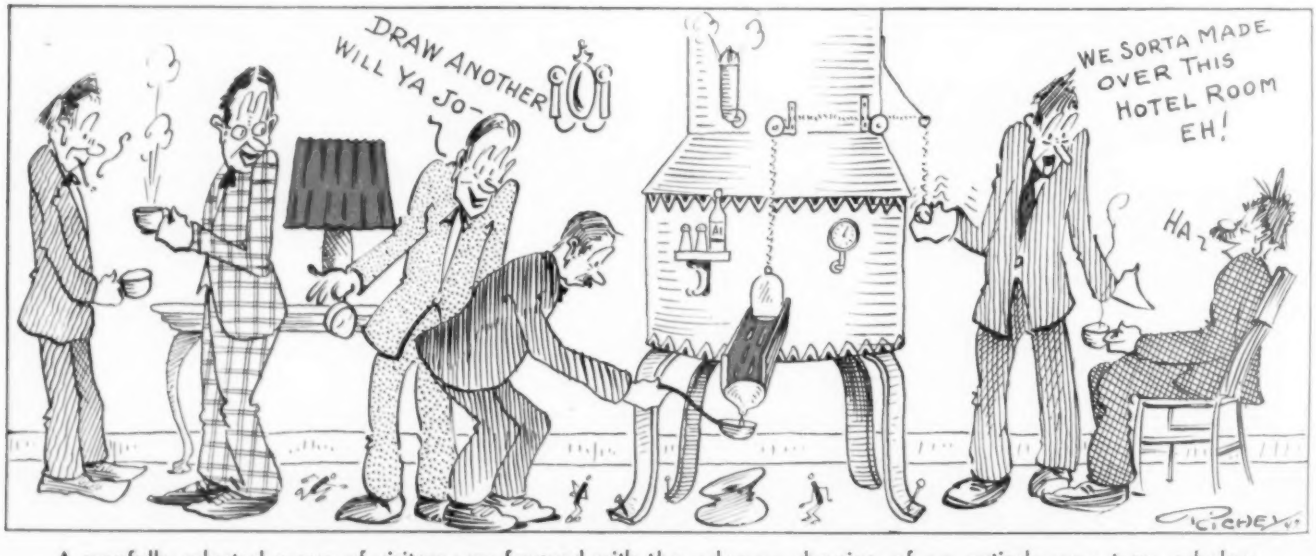
"A show of hands called for by the scholarly gent brought only one comrade to his feet. He said that he was not a professional gambler, but he had inherited a bit of sporting blood from an old Fenian grandfather, and he was prepared to lay a small wager in any game, any time, any place the honorable gent in the corner cared to name. The honorable gent explained coldly that he was referring to shambles, and not to the low form of sport, to which—he was sorry to see—the dog-face gent in the corner was addicted. The party of the second part muttered that he was no mind reader, but if he was pushed into a corner he could throw quite a beam of light on the geneological tree of the party who had just ceased barking.

"Rupture of amicable relations was averted when a little wisp of a fellow with a fog-horn voice declared that the reportorial use of the word 'smithy' always caused him to froth at the mouth. He would not go so far as to say it had stunted his growth, but he was quite sure that gnashing his teeth until they were worn down to the roots had seriously affected his digestion with resultant development of warts, corns, bunions, falling hair and skin discoloration on the outside and a regular playground for hospital doctors on the inside. He displayed a newspaper clipping showing an erect and sturdy old man with a hammer in his hand, and standing beside an anvil. Title of the story in large type was 'Smithy 80 Years Old, Still Works At Trade.' The wisp admitted that irrespective of a first name, and according to time-honored custom, every man by the name of Smith is known among his intimates as Smitty, but that is no excuse for referring to a man as a smithy because he works in a smithy, simply another and time-honored name for a blacksmith shop."

"And pray," I said, "where did you break into this quiet and affectionate family party? Are you waiting for a roll on the drums and a tar-an-ta-ra on the trumpets before you make an appearance? Because if you are, you can consider the seance over as of the present minute."

"Don't mention drums or bugles to me. After the experience and associations of this past several years, if I never hear a drum or bugle again, it will be too soon.

(*Continued on page* 192)



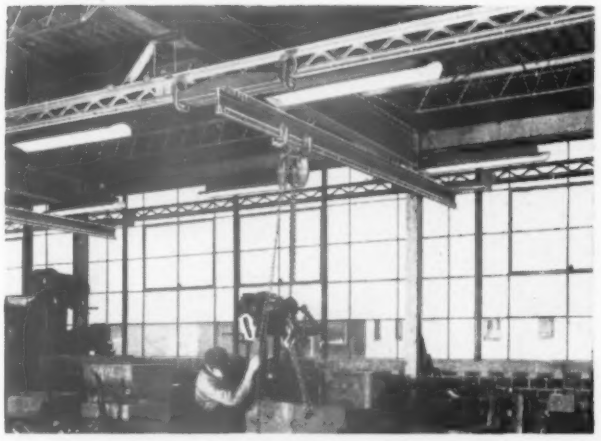
A carefully selected group of visitors was favored with the advance showing of an entirely new type cubelow

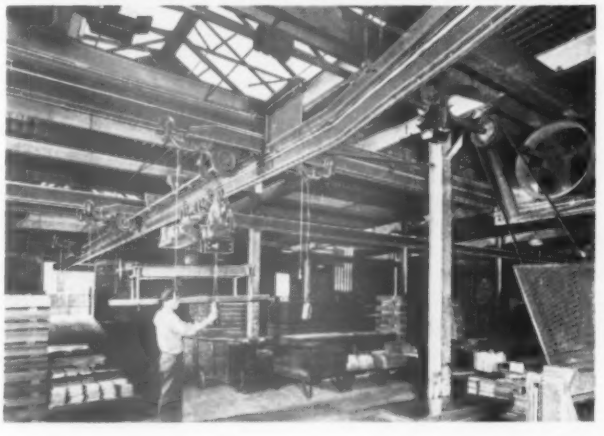
FREE MOVING CRANES

For

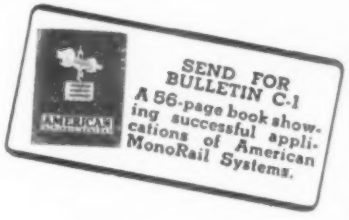
LOW COST HANDLING

American MonoRail Cranes supply overall coverage. Handling is not tied down to craneways since interlocking devices permit transfer in any direction. Free moving cranes serve every square foot of operating area. American MonoRail Cranes are available for any type of job. Low cost installation dovetails with low cost operation. They offer all the advantages of lightness, easy movement, strength, live-load capacity up to 5 tons.





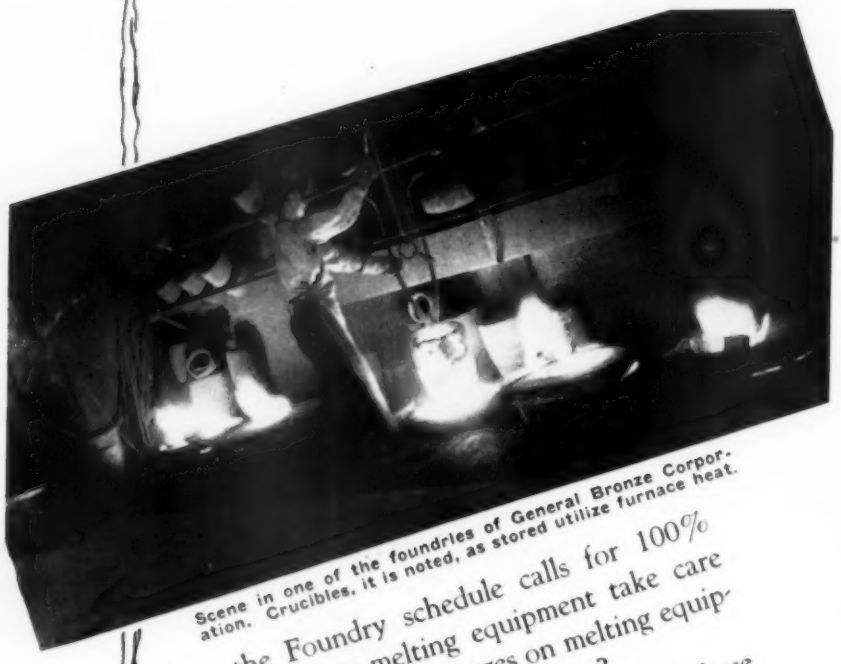
Consultation with American MonoRail engineers will reveal why American MonoRail Equipment has been selected to serve the nation's largest industrial plants. We invite your inquiry — no obligation of course.



THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE CLEVELAND 7, OHIO

Still Most Economical — Crucible Melting



Scene in one of the foundries of General Bronze Corporation. Crucibles, it is noted, as stored utilize furnace heat.

When the Foundry schedule calls for 100% production, will your melting equipment take care of it? What about capital charges on melting equipment when operating at 50% or lower?

Crucible melting is best suited to meet these fluctuations. The adaptability and flexibility of the crucible-equipped foundry allows for the ups and downs of a production schedule.

For the "ups" crucible melting is particularly appreciated; for the "downs" it is a most practical method of economy.

The foundry equipped with crucible furnaces, is ready for "come what may" in business.

There is practical information for foundrymen in the new fourth edition of Crucible Melters' Handbook; mailed free.

CRUCIBLE MANUFACTURERS ASSOCIATION

90 WEST STREET, NEW YORK 6, NEW YORK

(*Continued from page* 190)

However, touching on your esteemed query of even date, I overcame my shyness and modesty long enough to toss a small contribution into the wildcat's cage.

"Some time ago the editor of a local paper made reference in his column to an article in THE FOUNDRY dealing with cast iron dogs and other forms of lawn statuary quite prevalent in the 70's and 80's of the past century. He commended the author warmly for an elegant piece of writing. About two weeks later he had for a theme the origin and development of railroad conductor's ticket punches. Research on this subject, he wrote, gave him almost as much pleasure as THE FOUNDRY article on the stone dogs which he had touched upon in a former column. Highly incensed I wrote him indignantly:

All there except the chestnut tree

'You may know all about the conductor's punch, but certainly you never can hope for nomination as judge at a dog show. If we choose to accept the well known story, Lot's wife was turned into a pillar of salt. That was only a boy's job, compared with your modern miracle of converting a solid, substantial and withal beautiful cast iron dog into a hunk of stone!' "

"Very good," I said. "How did he wiggle out of that?"

"Well," said Bill. "I'll tell you. He wiggled out of it in a way that brought a warm blush of shame to these old withered cheeks. He wrote 'Dear Bill: Me and my stone dogs!'

"While I was on my feet I told the gang about a young veteran who wrote me that he would appreciate information on the construction and operation of a small cupola or, as he was pleased to call it, a cublar. You need not grin. Phonetically he is just as correct as the great army of

(*Continued on page* 194)

"Modern Foundries" can profit by foundry modernization too . . .

ARE YOU, as foundry owners or management, satisfied with the results you are getting with your present facilities? If you are not . . . or are undecided . . . consider that in many foundries simple changes, with virtually no capital equipment expenditures, have effected relatively substantial savings in costs.

Foundry Modernization does not mean *only* mechanization, and the finest mechanical equipment is no better than the men, methods and procedures employed in using it. The right patterns and rigging for the job, suitable flasks and production equipment, together with adequate servicing of the "producers" are necessary to insure efficient, low cost production.

Proper equipment, fair job evaluation, an equitable wage incentive, production and cost controls, are all "tools" of good management . . . not a substitute for it.

Lester B. Knight & Associates, an organization of more than thirty, is staffed by men with years of successful foundry management and engineering experience. Its purpose is to help foundries establish and use the most modern methods, plant layout, facilities and controls for efficient, low cost operation.

KNIGHT Service for Foundries:

- Foundry Engineering
- Architectural Planning
- Foundry Layout
- Foundry Modernization
- Foundry Management
- Industrial Engineering; Job Evaluation, Incentives
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Are you . . .

MELTING BRASS?

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BRASS MELTING FURNACES

STATIONARY . . . HAND TILT AND NOSE TILT TYPES

Built for Service

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FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

The Campbell-Hausfeld Co.

300-320 MOORE ST. HARRISON, OHIO

(*Continued from page* 192)

foundrymen, officers and privates and every grade in between who invariably pronounce the word 'kew-ba-low' with the principal accent on the *O*. Man and boy I have been around the foundry nearly all my life and I can lay my hand on my heart and truthfully say I never heard any person refer to the well known iron melting device as a kew-po-la with the accent on the final *A*. Why this should be so, I do not know, so on with the wind and let her blow! A touch of poetry, my boy. I bet you one of the lesser tin can, or tin pan alley boys could knock out a popular song with that for a base."

"With all that material for a base," I said, "one of these one string lads could knock out at least three popular songs—save the mark—each one worse than the others. With the diligence of a terrier at a rat hole he would resurrect the old Columbia record, 'Put Me Off the Train When We Come to Buffalo,' and turn out a mournful ditty with the tag rag refrain, 'When I Get the Dough Baby, I'll Get You a Baby Q-Ba-LO-O-O-W!' I trust you did not include any levity of this kind in your reply to this no doubt worthy prospective cublar operator. What size cupola did he have in mind? Or did he favor you with his confidence to that extent?"

"Well," said Bill, "I'll tell you. His letter was not exactly what you might call the spontaneous effort of a chatty lad, but he cautiously admitted that he had something about 10 or 12 in. in mind, and don't ask me if he meant inside or outside. Of course he meant inside. In the foundry no person ever refers to the outside diameter of a cupola for the simple reason that all the work is done on the inside, and the inside diameter may be varied to a considerable extent by changing the thickness of the lining. With all the foregoing extraneous material chopped off and thrown out the window, perhaps you will be kind enough to let me proceed with the remainder."

"The remainder? I should have known there was an Ethiopian concealed somewhere in the stack of cordwood. He wanted you to forward a set of working drawings and a book of instructions."

"Not a-tall. Not a-tall. He did not ask for a set of working drawings and a book of instruction. Following the confidential information on the cupola inside diameter, he asked for the proper fan size, height and number of tuyeres, weight of charges, height of charging door, position of slag hole and any other essential features.

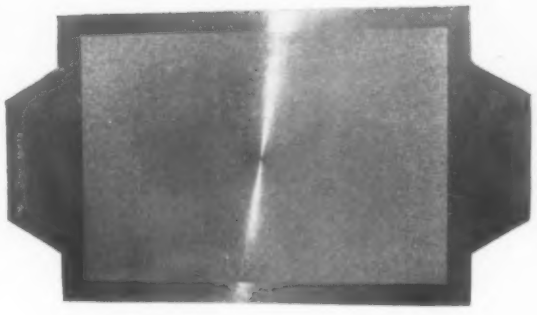
"In my reply I pointed out that since presumably the small cupola is to be used for melting only a small quantity of metal at any one time, several items necessary on a cupola running long heats may be

(*Continued on page* 196)

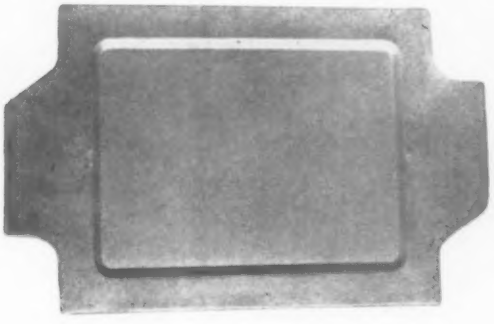
A NEW MACHINED PLATE—SUPERIOR NOSLIP

IS ANNOUNCED BY THE MANUFACTURERS OF THE WELL KNOWN SUPERIOR FLAT AND OFFSET PLATES. SUPERIOR NOSLIP PLATES ARE ACCURATE TO .002 AND SAND BLASTED INSIDE OF THE FLASK LINE TO PREVENT MOLD SLIPPING.

CAST ALUMINUM



SUPERIOR NO SLIP



SUPERIOR OFFSET

SUPERIOR COPE AND DRAG

PRICES

Flask Size	3/8"	1/2"	3/4"
10 x 14...	$7.25	9.50	
10 x 15...	8.00	10.50	
10 x 16...	8.25	11.00	
10 x 17...	8.75	11.75	
10 x 18...	8.75	11.75	15.00
10 x 19...	9.50	12.75	16.00
10 x 20...	10.15	13.50	18.00
10 x 22...	11.50	14.75	22.00
10 x 24...	12.50	16.50	25.00
10 x 26...	13.25	17.50	27.00
10 x 28...	14.75	18.50	28.00
10 x 30...	15.50	20.00	29.00
10 x 32...	16.50	21.50	30.00
11 x 14...	7.75	9.75	
11 x 15...	8.00	10.50	
11 x 16...	8.50	11.25	
11 x 17...	9.00	12.00	
11 x 18...	9.50	12.50	18.00
11 x 19...	9.90	13.25	20.00
11 x 20...	10.40	14.00	21.00
11 x 22...	10.50	14.75	23.00
11 x 24...	11.50	15.00	24.00
11 x 26...	13.00	17.25	25.00
11 x 28...	14.00	18.50	27.00
11 x 30...	16.00	20.00	30.00
11 x 32...	17.00	22.00	31.00
12 x 12...	7.50	10.00	
12 x 13...	8.00	10.50	
12 x 14...	8.50	11.25	
12 x 15...	8.75	11.75	
12 x 16...	9.00	12.00	17.00
12 x 17...	9.50	12.50	18.00
12 x 18...	10.00	13.25	19.00
12 x 19...	10.75	14.25	20.00
12 x 20...	11.75	15.00	23.00
12 x 22...	12.75	17.00	26.00
12 x 24...	14.50	18.50	28.00
12 x 26...	15.25	20.50	30.00
12 x 28...	17.00	22.75	34.00
12 x 30...	19.00	25.25	37.00
12 x 32...	20.00	26.75	38.00
12 x 34...	21.00	28.00	39.00
12 x 36...	22.50	30.00	40.00
13 x 13...	8.50	11.25	
13 x 14...	8.75	11.75	
13 x 15...	9.00	12.00	
13 x 16...	9.50	12.75	
13 x 17...	10.25	13.50	
13 x 18...	11.25	15.00	20.00
13 x 19...	12.00	16.00	23.00
13 x 20...	13.25	17.50	25.00
13 x 22...	14.25	18.50	27.00
13 x 24...	15.25	20.50	29.00
13 x 26...	17.00	22.75	33.00
13 x 28...	18.00	24.00	35.00
13 x 30...	20.00	26.50	40.00
13 x 32...	22.00	29.00	42.00
13 x 34...	24.00	32.00	45.00
13 x 36...	26.00	34.50	47.00
14 x 14...	9.25	12.50	16.00
14 x 15...	9.90	13.25	17.00
14 x 16...	10.25	13.50	18.00
14 x 17...	11.00	15.00	20.00
14 x 18...	12.25	16.00	22.00
14 x 19...	13.00	17.50	23.50
14 x 20...	13.75	18.25	25.00
14 x 22...	14.75	20.00	29.00
14 x 24...	17.50	22.50	33.00
14 x 26...	18.50	24.50	35.00
14 x 28...	19.75	25.50	37.00
14 x 30...	21.00	28.00	40.00
14 x 32...	24.00	32.00	43.00
14 x 34...	26.00	34.50	46.00
14 x 36...	28.00	35.00	48.00
15 x 15...	11.00	14.75	20.00
15 x 16...	12.00	16.00	21.00
15 x 17...	13.00	17.25	22.00
15 x 18...	13.75	18.25	24.00
15 x 19...	14.50	19.25	27.00
15 x 20...	15.25	20.00	30.00
15 x 22...	16.25	21.50	31.00
15 x 24...	17.00	22.50	32.00
15 x 26...	19.00	25.00	36.00
15 x 28...	22.00	29.00	38.00
15 x 30...	24.00	32.00	41.00
16 x 16...	13.00	17.25	22.00
16 x 18...	14.25	19.00	24.00
16 x 20...	16.00	21.00	29.00
16 x 22...	17.50	23.00	33.00
16 x 24...	20.00	26.00	34.00
16 x 26...	22.00	29.00	35.00
16 x 28...	23.00	30.00	38.00
16 x 30...	25.00	33.00	42.00
18 x 18...	18.75	25.00	33.00
18 x 19...	19.25	25.50	34.00
18 x 20...	20.00	26.50	35.00
18 x 22...	22.00	29.00	36.00
18 x 24...	23.00	30.50	37.00
18 x 26...	24.00	32.00	38.00
18 x 28...	25.00	33.50	40.00
18 x 30...	27.00	35.00	43.50
20 x 20...	20.25	27.00	35.00
20 x 24...	23.00	30.00	40.00
20 x 30...	28.00	35.00	48.00

Discount less than 6 net; 7-12 less 5%; 13 to 50 less 10%; over 50 less 15%.

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Flat Velvet finish plates from 10x14 to 20x30; 3/8, 7/16, 1/2 and 3/4" thick.

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Cope & Drag Cast Plates; Flat, Offset or Machined with or without Ribs to your specifications.

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MANUFACTURERS OF SUPERIOR PATTERN SHOP SUPPLIES

Complete Eye and Face **Protection** for the Foundryman

M·S·A Faceshields

The preformed "Head-Line" design headgear fits the natural contours of the head; is adjustable to any head size. Three types: Full spark-guard (illustrated), Semi-spark-guard, No spark-guard.

Here's durable and convenient protection for the eyes and face against light flying particles. M.S.A. Faceshields are lightweight and comfortable . . . equipped with the "Head-Line" headgear . . . featuring a tilting visor that may be raised or lowered, and securely held in either position. Clear or green visors, available in three lengths, are quickly and easily replaced, and are interchangeable on all headgears. Write for Bulletin CN-23!

M·S·A GOGGLE CLEANING CABINET

Encourages Workers to keep their Goggles Clean

Ideal for wall mounting at convenient locations throughout the shop, the M.S.A. Goggle Cleaning Cabinet makes goggle cleaning a quick, easy operation. A turn of the dial dispenses Fogpruf—effective cleaning and anti-fogging agent—cleansing tissues are pulled from an opening in the bottom of the Cabinet and disposed of in the receptacle at the side.

A TURN OF THE DIAL DISPENSES JUST THE RIGHT AMOUNT OF *FOGPRUF* ON BOTH LENSES

Clean, clear goggles are essential for efficient production without costly errors or accidents. Encourage clean goggles with the M.S.A. Goggle Cleaning Cabinet. Bulletin No. CE-28 gives you the details.

MINE SAFETY APPLIANCES CO.
Braddock, Thomas and Meade Sts.
PITTSBURGH 8, PA.

(*Continued from page* 194)

omitted. As with the construction and operation of any type cupola, more attention to detail will be required on a cupola running long heats, than on a cupola merely employed now and again in melting a small amount. On many occasions THE FOUNDRY has presented descriptive articles on small cupolas, usually developed for taking care of small emergency jobs. Also it may not be out of place to direct attention to the fact that small cupolas, known as cupolettes, are built by several firms who specialize in the manufacture of this and other forms of industrial equipment.

"Practically any kind of a casing lined with brick and blown by a fan will melt iron. Instances include discarded oil drums, hot water tanks, smokestacks, small boiler shells, cast iron and steel rings and other metal containers. Primitive cupolas in China are small cast iron containers lined with clay and blown by a piston type device actuated by hand. An ingenious American engineer isolated at a silver mine in Mexico, 200 miles from a railroad, built a cupola of adobe bricks and melted enough iron to cast three 3-ft diameter gear wheels. During the late war a group of soldiers on a lonely South Pacific island improvised a foundry and made castings under conditions that would have induced Tubal Cain, Hiram of Tyre, Cellini and other prominent members of Local No. 1, Ancient and United Order of the Rammer and Shovel, to draw their back time and quit.

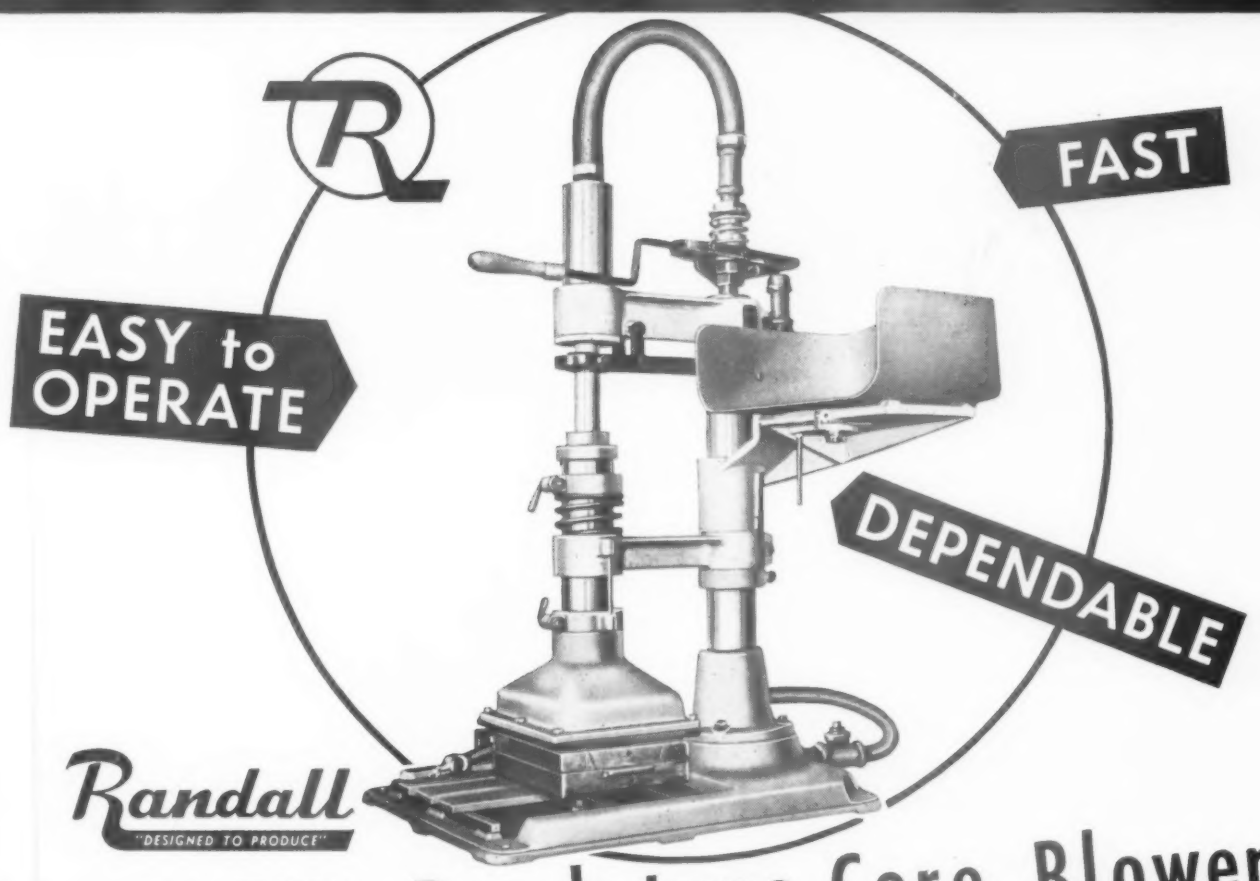
"The late Robert Emmett Masters, a prominent and pioneering foundryman, wrote an article in the early 80's referring to a method for melting iron in a bull ladle. The ladle was filled with coke or coal with the iron charge in an extension on the top. Air was blown through a pipe at one side near the top of the ladle. The molten metal ran down and was collected in the ladle.

"Probably the most remarkable instance of iron melting is recorded by the late Thomas D. West, in one of his books, *The Moulder's Text Book*, published in 1885. The account dealt with a foundry float in an industrial parade in Cleveland. Metal was melted in a brick lined flour barrel, poured into miniature lucky horse shoes made in a snap flask mold and thrown to admiring spectators standing by the curb. A hand bellows was employed to blow air into the furnace.

"In the historical introduction to Dr. Moldenke's *Principles of Iron Founding* the author refers to a communication from a British iron master who stated that his late lamented, highly respected and ingenious foundryman grandfather on several occasions had melted iron in a sugar

(*Concluded on page* 198)

CUT Core Room Costs



The NEW Bench-type Core Blower

No sand cartridges

Show us a foundryman who is interested in cutting costs and we'll show him one way to go about it. We'll show him the RANDALL CORE BLOWER.

A bench-type blower, the RANDALL boasts many exclusive features which serve to increase production in the core room from three to five times over ordinary and old-style core-making methods. The RANDALL'S swing-type blow head permits the blowing of multiple cores without refilling, while the 360-degree turning radius of the head makes it readily adaptable to core boxes of all shapes. *A single operation simultaneously clamps the head and blows the core,* and additional features like the RANDALL RAPID-CHANGE PLATE and the RANDALL SNAP-ACTION TOGGLE SIDE CLAMP contribute still further to the blower's efficiency and serviceability.

Write for complimentary descriptive bulletin.

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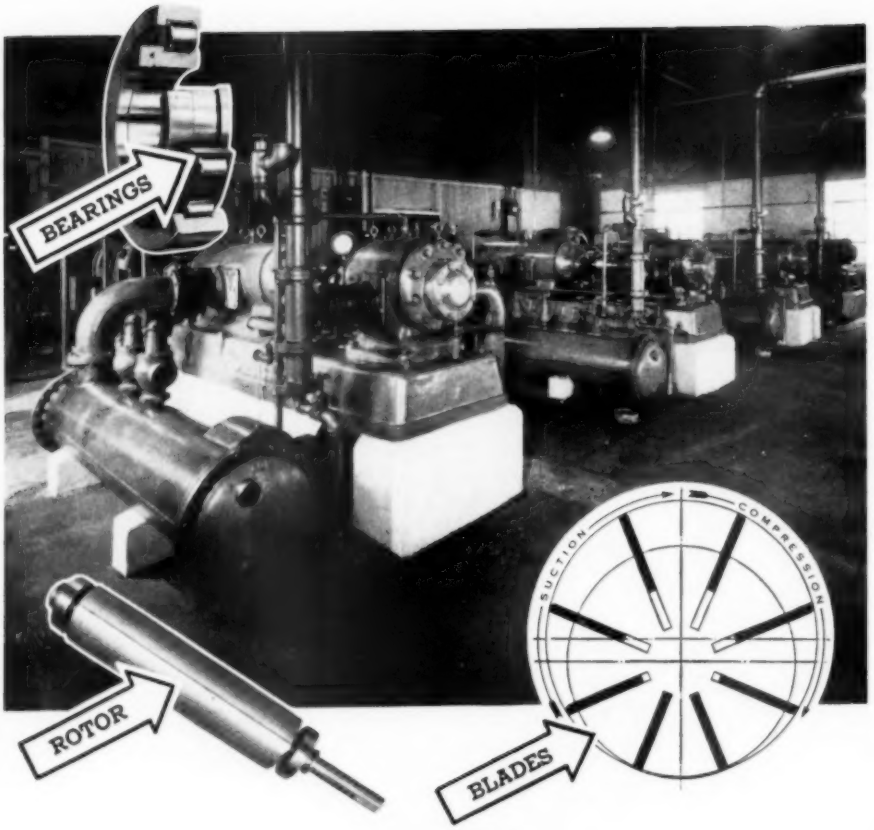

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The fewer working or moving parts that make up any piece of equipment, the more continuous the service at lowest operating cost.

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Simple design, rugged construction for long, continuous service, that's what you get when you purchase a Fuller Rotary. There are no periodical adjustments or take-up and, due to design and construction, *original capacities are maintained for the life of the machine.* This simplicity of design also allows inspection and repairs to be made with minimum loss of time and at minimum expense.

Fuller Rotaries are the ideal units to install for capacities up to 3300 c. f. m., 125-lb pressure. We invite your investigation and inquiries. We'll be glad to send you Bulletin C-5, which fully describes and illustrates these machines. Send for your copy today.

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Chicago 3 - 120 So. LaSalle St.

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C-152

FULLER

A LIFETIME OF NEW MACHINE EFFICIENCY

(*Concluded from page* 196)

hogshead lined with brick. Dr. Moldenke saw no reason for doubting this statement. At about the same period itinerant tinkers traveled around the country like Mary's little lamb, dragging small, portable cupolas behind them for knocking off new castings or repairing broken pieces of equipment. Unfortunately he does not elaborate on the subject. Therefore we have to venture a guess on the character of the fuel and the method and equipment employed for delivering the blast to the cupola.

"From the foregoing it is apparent that the small emergency shell need not be over 5 or 6 ft high. The shell is provided with a 6 x 8-in. opening in front for a breast and tap hole. No slag hole is necessary on short heats. Two 3-in. openings on opposite sides, 10 in. above the bottom, will serve as tuyeres. A Y pipe leading to the tuyeres may be connected to any type fan, blower or bellows capable of delivering 150 cfm at a pressure of about 6 oz. Where the service is available, an air line from the compressor may be tapped. A drop bottom is more convenient then a solid bottom but is not absolutely essential. Hundreds of solid bottom cupolas still are in use in European countries.

"In congested quarters, or under a low roof, it may be necessary to provide a hood and smokestack to confine flame, smoke and sparks. In any fairly open space this device may be omitted. No charging door is necessary. All the material is dumped in through the open top. Material for the charge—pig iron, scrap and coke—is thrown up to a platform at one side or entirely surrounding the cupola. Later the operator throws the material into the cupola. The coke bed extends 36 in. above the tuyeres and each charge consists of 15 lb coke and 100 lb iron broken into small pieces.

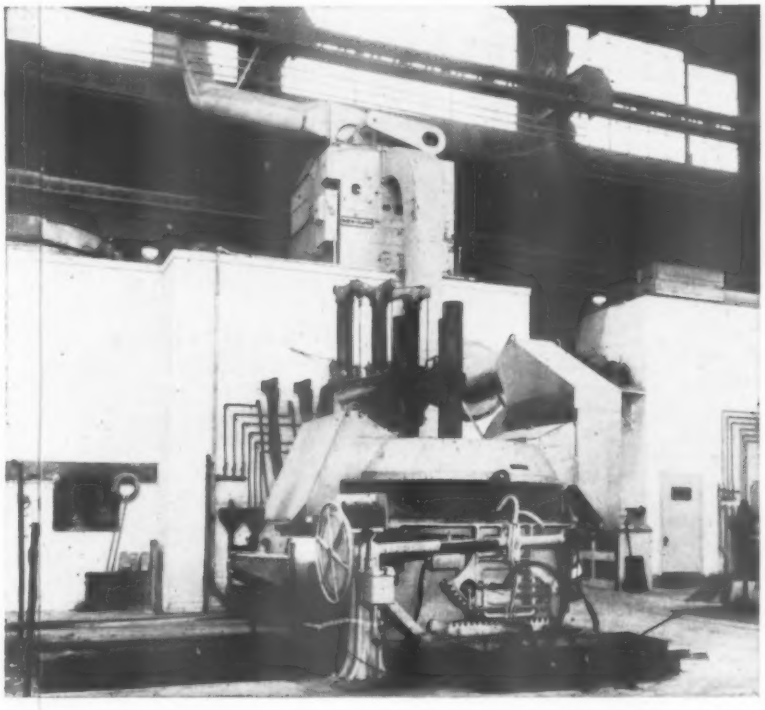
"There," said Bill, "that is enough for one session. I'll tell you the rest again."

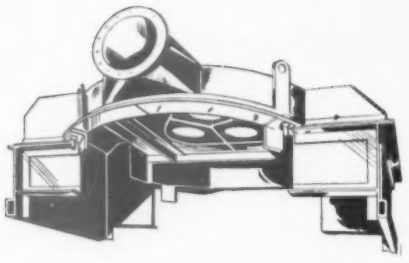
Number of Women Employees Down

Number of women employed in durable goods production jobs was 13 per hundred of total employment in June, 1946, which was still well above the prewar 1939 level of 8.6, according to the U. S. Department of Labor. In the gray iron casting industry for June, 1946, 5 per cent of the production workers were women, compared with 6 per cent for June, 1945. In the malleable iron casting industry there were 6 per cent in June, 1946, compared with 9 per cent for June, 1945. In the steel castings industry women constituted 2 per cent of the production workers in June, 1946, and 6 per cent for the like 1945 month.

ANOTHER SMOKE SOURCE COMES CLEAN

to make the foundry a better place to work





YES, this is an electric furnace under full operation. Note the complete absence of smoke, dust and fumes—the neat, clean appearance of the building interior. Magic? No, just the normal results to be expected with the installation of an AAF Furnace Hood plus Roto-Clone Dust Control.

The unit pictured is a 6-ton, size CQ, side charge, acid furnace. The AAF hood is designed not to interfere with furnace movement for pouring, slagging or charging. A Type N Roto-Clone, located directly above furnace, provides sufficient air flow to prevent escapement of dust, smoke and fumes by applying positive local exhaust at electrodes, charging door and pouring spout. On reaching the Roto-Clone, a high percentage of the oxides and smoke are scrubbed from the airstream before it is exhausted, thereby eliminating any nuisance to the community.

Now is the time to plan furnace smoke control if it is to be ready by winter—the season when freedom from this nuisance is most beneficial and appreciated. Write today for Bulletin No. 278, describing the AAF Furnace Hood and Roto-Clone Dust Control System.

AMERICAN AIR FILTER CO., INC.
266 Central Avenue, Louisville 8, Ky.

AAF

ROTO-CLONE
DUST CONTROL EQUIPMENT

ATTRACTIVELY PRICED

thru

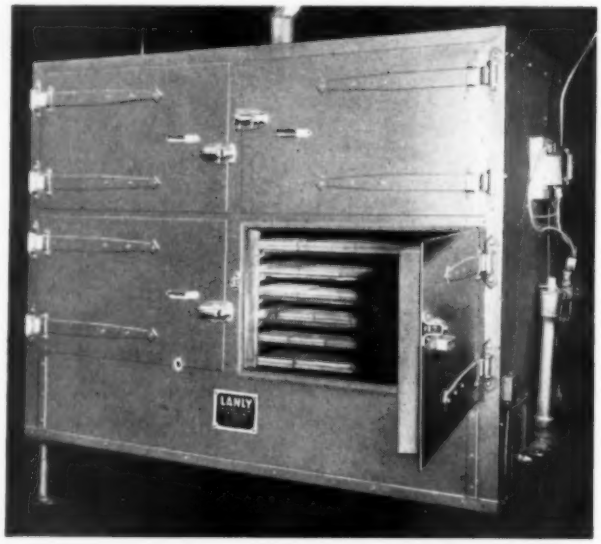
Standardized Design

available in 3 sizes

MODEL 84—
94″ wide, 42″ deep
75″ high.

MODEL 60—
82″ wide, 36″ deep
75″ high.

MODEL 30—
70″ wide, 30″ deep
63″ high.



These **LANLY** **SHELF TYPE CORE OVENS**

Quantity production of these standardized shelf type ovens—performance proved in service—affords these advantages:

1. **Economical, satisfactory performance proved under varying conditions.**
2. **Lower prices than necessary for individually designed and specially built units of similar capacity.**
3. **Quicker delivery than required for specially developed units.**

These ovens are ruggedly built and completely self-contained. Thoroughly insulated and completely encased in metal. Economically fired by gas and uniformly maintained in temperature by the latest control devices. Well insulated doors are mounted on extra rugged hinges and equipped with explosion type latches. Liberal in size and heat capacity.

SEND COUPON FOR DATA QUICKLY

Three standard sizes are available as shown above. Sign, tear out and mail for price and complete information covering the oven adapted to your needs.

THE LANLY CO.
OVENS FOR INDUSTRY
HEATED BY GAS, OIL, ELECTRICITY OR STEAM
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Send me additional information and price on a Model Number ..... Lanly Cabinet Oven.

Company .....

By..... Title.....

Address..... City.....

UNSOUNDNESS IN COPPER-BASE ALLOYS

(*Continued from page* 82)

gas evolution are as follows:

Type 1 *Gas Evolution.* In this type of gas evolution, the gas is dissolved in the melt, but the solubility of such gases decreases abruptly when the melt solidifies. Consequently, if the gas dissolved in the melt exceeds the solid solubility of the gas in the metal at the solidus temperature, some gas evolution will occur which will in turn cause unsoundness as described previously. In copper-base alloys, the most likely gases to dissolve in the melt and which may precipitate out during solidification as a result of a change in solubility are: (1) hydrogen, (2) carbon monoxide, (3) carbon dioxide, (4) sulphur dioxide, and (5) nitrogen. It is not likely that all of these are sources of difficulty, but this subject will be considered more specifically later.

Type 2 *Gas Evolution.* The second type of gas evolution results from the formation of a gaseous compound by the reaction of oxygen or an oxide dissolved in the melt with an oxidizable material also dissolved in the melt. The most likely reactions to occur are as follows:

A. 2 H + (for an oxide) $\rightleftharpoons H_2O$
B. S (or a sulphide) + 2 O (or an oxide) $\rightleftharpoons SO_2$
C. C (for a carbide) + O (or an oxide) $\rightleftharpoons CO$
D. CO + O (or an oxide) $\rightleftharpoons CO_2$

In each of the above four reactions, a reducing material dissolved in the melt is assumed to be reacted upon by atomic oxygen or an oxide which is also in solution in the melt, or which is absorbed or dissolved by the melt from the atmosphere during the pouring operation. If the reaction products—steam, sulphur dioxide, carbon monoxide, and carbon dioxide—are formed in amounts in excess of their solid solubility at the solidification temperature, they would be precipitated as a result of the reaction during the process of solidification. The resulting gaseous evolution then accentuates the microporosity or possibly forms the pinhole type of unsoundness as described previously.

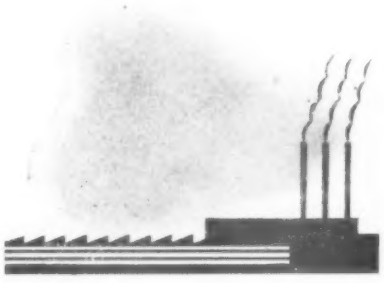
It should be emphasized at this point that Type 2 gas evolution occurs between oxygen or an oxide and a reducing material, both of which are dissolved in the melt. The oxygen might be continuously absorbed from an outside source. Thus, during solidification, the oxygen in the reaction may be a residual in the melt or it may be absorbed from an outside source such as the atmosphere. In any event, these two constitu-

(*Continued on page* 202)

ARE YOU KEEPING UP WITH JONES?

The return of competition must figure largely in the plans of management today. To be abreast of what is new is the minimum price of profit in the period just ahead. New methods... new machines... new ways of handling men which lead to more production—these are the keys to profit when enterprise is free.

Wise management draws freely on competent outside help. Our permanent staff offers a broad background of experience in engineering and management practice—plus much specific "know-how" in the field of foundry operation and modernization. We would like to discuss your problems in the light of our experience. A note or phone call will bring one of our principals to your office, without obligation.



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Our specially prepared SILICA SANDS are available in various sizes. We have the particular grade best suited for your requirements. ¶ You will find our SANDS most suitable for cores—they save oil—they are clean, uniform and constant in quality. ¶ SILICA FLOUR, at its best, for foundry uses.

OTTAWA SILICA COMPANY
Ottawa, Illinois

(*Continued from page* 200)

ents, the oxygen or oxide and the reducing gases or gas former, are in equilibrium in the melt in the pot.

However, when solidification begins, it is a characteristic of all impurities to be concentrated in the remaining portion of the liquid. As a consequence, the concentrations of both reactants are increased in the remaining liquid, the equilibrium is destroyed, and the reaction proceeds to the right, causing a gaseous evolution of the compound, or reaction product. It is possible that Type 2 gas evolution may form first, producing nuclei on which Type 1 gas evolution may occur. If so, such a process might account for bubble formation in the melt.

It will be noted that Type 1 gas evolution results from decreasing solubility of the gas in the solidifying melt, while Type 2 gas evolution is a result of the formation and precipitation of a gaseous compound in the solidifying melt. These will be referred to repeatedly as Type 1 and Type 2 gas evolution, and the four reactions listed under Type 2 gas evolution will be referred to as Reactions A, B, C, and D, as listed previously.

Presumably these two types of gas evolution can occur in all solidifying metals, regardless of the base material, but depending upon the various gas-metal systems, some of the types and kinds of gas evolution may be very unimportant. For example, Type 2 gas evolution is probably quite unimportant in aluminum and magnesium alloys. All of these possible types and kinds of gas evolution in copper-base alloys have been investigated by various workers. Fortunately, it is not probable that all of these are sources of difficulty in copper-base alloys, but each will be considered in greater detail in a later paper.

Sources of Gases or Gas Formers—It is evident that the possible gases causing trouble are hydrogen, carbon monoxide, carbon dioxide, sulphur dioxide, and nitrogen. The possible gas-formers causing unsoundness are carbon and sulphur. The sources of these gases and gas formers are an important consideration.

Moisture can be a source of both hydrogen and oxygen; furthermore, if hydrogen and oxygen are produced from the decomposition of moisture or steam, both are in a very active or nascent condition. It is a well known metallurgical principal that such nascent atomic gases are far more active and are more readily absorbed by the melt than compound gases, or molecular forms of the biatomic gases. Thus, atomic hydrogen is far more active than molecular hydrogen, H_2. There are many sources of moisture. A common one is moisture which occurs naturally

(*Continued on page* 204)

Repeat shipments are of absolutely like analysis... that's KEOKUK Electro-Silvery

FOUNDRIES

30-pound Keokuk Electro-Silvery Pigs for charging mechanically into the cupola. Easily broken into two or more pieces, handled by magnet and measured by weight. Regular or alloy analysis.

12½-pound Keokuk Electro-Silvery Piglets so uniform in weight that they may be charged into the cupola by count, eliminating weighing operations. Handle by magnet. Regular or alloy analysis.

STEEL PLANTS

60-pound Keokuk Electro-Silvery Pigs for blocking the open hearth heat. For equal distribution of silicon and best temperature meltdown. Handle by magnet. Regular or alloy analysis.

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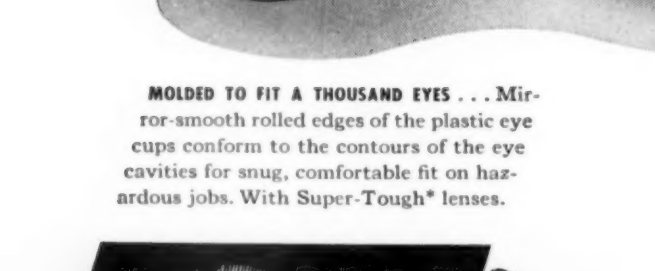
MOLDED TO FIT A THOUSAND EYES . . . Mirror-smooth rolled edges of the plastic eye cups conform to the contours of the eye cavities for snug, comfortable fit on hazardous jobs. With Super-Tough* lenses.



ALL 'ROUND PROTECTION—ALL 'ROUND COMFORT . . . Metal fumes; chromic acid mists; all dusts—excluded by dual, easy breathing filters and snug fitting facepiece.

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PRODUCTS INCORPORATED

READING, PA., U. S. A. Established 1870

237 WASHINGTON STREET, READING, PA., U.S.A.

(*Continued from page* 202)

in the atmosphere, and this will vary, of course, with the absolute humidity from less than 1 grain per cubic foot of air in dry climate or during the wintertime, to 12 or 13 grains per cubic foot of air in hot, humid weather.

Moisture is also one of the principal products of combustion of oil or gas, since these hydrocarbon fuels contain a large proportion of combined hydrogen which is oxidized to form steam in the gas or oil flame. Moisture will also be adsorbed on or chemically combined with the crucibles and other furnace equipment from which it could be adsorbed by the melt should it contact such surfaces. Gas absorption from new, though preheated crucibles or from preheated contaminated pouring ladles has also been reported.[2]

Moisture Always Present

Adsorbed gases also occur on the metal charge from which it may be absorbed by the melt. Adsorbed gases are, however, readily removed by slightly preheating the metal charge and the melting-room equipment, but chemically combined moisture is not so readily removed. Moisture in the atmosphere also contacts the melt during the pouring operation, and a considerable amount of steam is formed in the mold cavity which might also be a source of gas absorption. It may be concluded, therefore, that there are ample sources of moisture to provide both atomic hydrogen and oxygen, which may be dissolved by the melt.

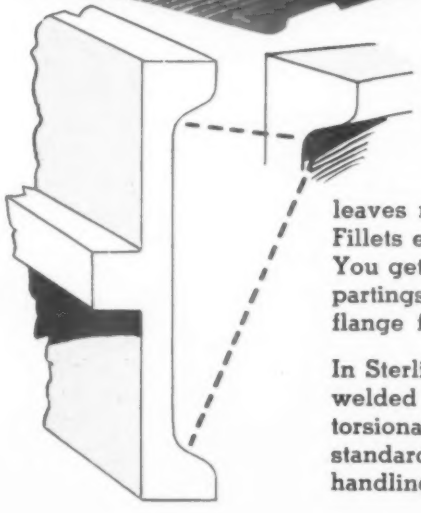
It has been noted that the gas former, sulphur, or the gas, SO_2, might be a source of gas evolution. If sulphur is present in the metal, it would normally be in solution in the liquid melt and precipitate out as Cu_2S or possibly other sulphides when the melt solidifies. Accordingly, the most common sources of this sulphur are: (1) as an impurity in the metal, and (2) as SO_2 absorbed from the products of combustion. Since many oils, cokes, and coals contain a fairly high percentage of sulphur, a portion of it could conceivably be absorbed by the metal from the furnace atmosphere.

According to Reaction C, listed previously, carbon dissolved in the melt might cause some unsoundness as a result of its reaction with oxygen during the process of solidification. A source of such carbon would normally be from clay-graphite crucibles used in the melting operation, or from the charcoal placed on top of the melt to prevent oxidation, or possibly by the absorption of carbon monoxide or carbon dioxide, which are common constituents in the products of combustion of all fuels.

The sources of oxygen are as O_2 in

(*Continued on page* 206)

Sterlings for High Speed Molding!



No Soft Spots with Sterling Rolled Flange Construction

Sterling Heavy Duty Foundry Flasks are built RIGHT for modern high-speed production. Even top speed sand slinger molding leaves no soft spot under the exclusive patented Sterling sand flange. Fillets eliminate sharp corners at top and bottom of both cope and drag. You get faster molding . . . and later, an easier shakeout. Sterling Flask partings are machined square for full-width bearing. Plenty of steel on flange for several refinishings. Flange will not curl under jolt action.

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Sterling FOUNDRY FLASKS

STERLING WHEELBARROW COMPANY • Milwaukee 14, Wis., U.S.A.

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EXCLUSIVE THREAD STEM . . . not *one*, but *many* sharp, coarse, circular rings which have a larger diameter than the stem itself. This thread runs from head-to-head on Double Head Chaplets.

WELDED HEADS . . . make these chaplets one piece of metal. It is impossible to separate heads from stems.

EXTRA THIN HEADS . . . reduce surface casting marks to a minimum; cut machining costs substantially.

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SURE KNIT . . . made of special *low carbon* steel for quick fusing.

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Milwaukee Double-or Single-Head, Thread Stem Chaplets are made in all Standard Lengths, Stem Diameters and Head Sizes. Also to Your Specifications on Special Order. NOTE: They cost no more than ordinary chaplets.

Milwaukee
CHAPLET AND MANUFACTURING CO.
1025 S. 40th STREET • MILWAUKEE 4, WIS.

A 4913-5/3

(*Continued from page* 204)

the air, and from H_2O in the atmosphere, or other sources of moisture listed previously. In any event, the oxygen, regardless of its sources, would have to be dissolved in the melt before it could take part in Reactions A, B, C, or D. Furthermore, its behavior would be the same if it were dissolved as atomic oxygen O, or as an oxide undissociated or partially dissociated as follows:

$$MxOy \rightleftharpoons xM + yO$$

The exposure of the melt to these various gases or gas-forming materials will depend considerably upon the type of equipment used for melting, the fuel used, and the general melting technique employed. This phase will be considered in a later paper.

Amount of Gases or Gas Formers Required—The quantity of gases and gas formers required to precipitate by Type 1 gas evolution, or to react in Type 2 gas evolution to produce 1 per cent voids at 1900 F in a solidifying copper-base alloy having a density of 8.6 g per cubic centimeter at 1900 F is indicated by the data in Table I. One per cent voids in the form of microporosity would have a considerable adverse effect on the properties obtained. The main significance of these calculated values listed in Table I is the extremely small quantities of gas or gas formers required to produce 1 per cent voids in the castings.

Summary—Microporosity is the small, more or less interconnected, microscopic cavities variously known as incipient shrinkage, microshrinkage, porosity, shrinkage, gas porosity, etc. There are three factors which mainly determine the amount of microporosity in a given casting. These factors are as follows:

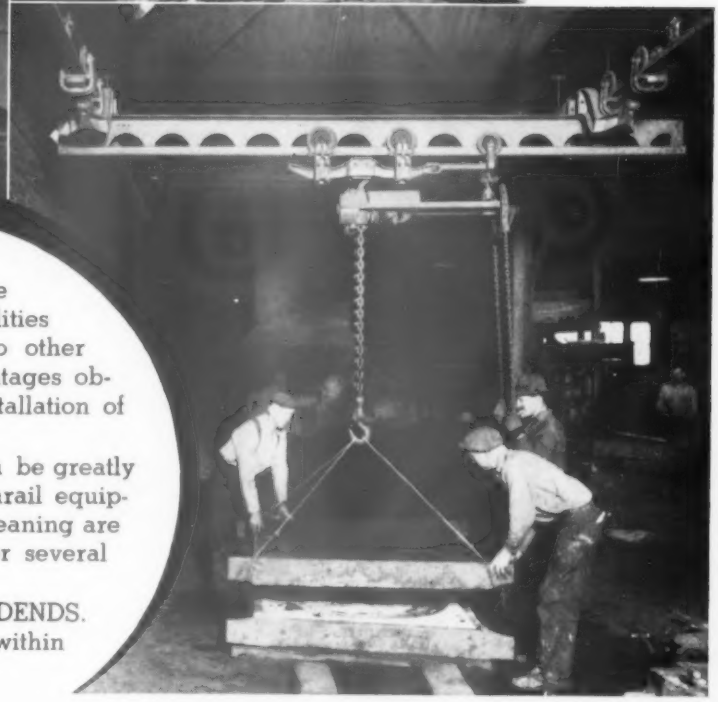
1. *Alloy composition.* The alloys of the solid-solution type which solidify over a considerable range in temperature without the formation of any eutectic liquid are the most prone to the formation of microporosity. The alloys which solidify nearly at constant temperature or with a considerable amount of eutectic liquid at the end of solidification are the least prone to form microporosity.

2. *Gating, risering, and chilling methods.* Microporosity is decreased by steepening the temperature gradient toward the risers by proper gating, risering, and chilling methods.

3. *Gas content of the melt.* The first two factors determine the width of the mushy zone through which feeding is difficult or impossible.[3] Reduction of the gas content of the melt reduces the amount of gas in the voids which normally result from shrinkage. The gas in the voids hinders further entry of liquid metal into the voids and, therefore, prevents feeding even though

(*Concluded on page* 208)

SPEED MOLD-MAKING
the efficient Cleveland Tramrail Way



Wherever materials of any kind in a foundry are lifted, moved or handled, there usually are possibilities for effecting important economies. Probably in no other way can so much be saved and as many advantages obtained for such a small investment as through installation of proper materials handling equipment.

Mold-making is one of the many jobs that can be greatly eased and speeded with overhead Cleveland Tramrail equipment. Pouring, sand-handling, cupola-charging, cleaning are others. Often the same equipment can be used for several different purposes.

Cleveland Tramrail pays dividends — BIG DIVIDENDS. Most installations pay for themselves out of savings within one year; some in less than six months.

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THE CLEVELAND CRANE & ENGINEERING CO.
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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

YOU CAN PUT YOUR FOUNDRY ON A LOW-COST PRODUCTION BASIS USING STANDARD CONVEYORS

In nearly every phase of foundry work, where volume handling of flasks, molds, sand or castings becomes almost a full time job—Standard Conveyor Co. makes a conveyor that will lower your handling cost and make men available for productive work.

Investigate Standard Conveyors for foundry use—they can be used as small sections or complete systems to speed up handling in departments or throughout your plant. They can relieve congestion too!

Available in varying widths, weight carrying capacities and combinations — there's a Standard Conveyor to suit nearly every individual requirement. Send for this free booklet that shows applications and ideas for conveyors in foundries — ask for bulletin F-547.

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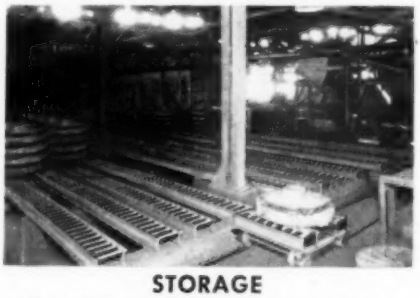
General Offices: North St. Paul 9, Minn.

Sales and Service in Principal Cities

MOLDING FLOOR

When molding's complete—loaded on conveyors—jobs move smoothly and quickly to next step.



STORAGE

All lined up ready for pouring and moving to shake-out — and return to molders out of the way — yet ready for instant moving to molders, furnaces or pouring station.

POURING STATION

Neatly aligned, the pouring job is simplified — molds can be quickly moved out of the way for cooling and shakeout.

STANDARD

Gravity and Power

CONVEYORS

ENGINEERED FOR FASTER PRODUCTION

(*Concluded from page* 206)

adequate risering has been provided. Of these factors, only the gas problem has been considered in this paper.

There are two types of gas evolution which are possible. In Type 1, gas is evolved as a result of the decrease in its solubility when the melt cools and solidifies. Type 2 gas evolution is caused by the reaction of the gas or gas-forming material with oxygen which coexists in solution in the melt. Of the Type 1 gas evolution, hydrogen, carbon monoxide, carbon dioxide, sulphur dioxide, and nitrogen are possible causes of trouble. Of this list, present information indicates that only the first and possibly the second are sources of trouble. Of the Type 2 gas evolution, oxygen may combine with hydrogen, sulphur, carbon, or carbon monoxide as the most likely possibilities. Present information indicates that hydrogen is certainly a source of unsoundness, while carbon and carbon monoxide may be sources of unsoundness by this type of gas evolution.

(Copyright 1947 by R. D. T. Hollowell for the benefit of the members of the Non-Ferrous Ingot Metal Institute.)

Bibliography

1. Eastwood, L. W., "Microshrinkage in the Light Casting Alloys," *Light Metal Age*, May, 1944.

2. Battelle Memorial Institute Reports to Non-Ferrous Ingot Metal Institute, 1944-1945, unpublished.

QUALITY CONTROL SERVICE

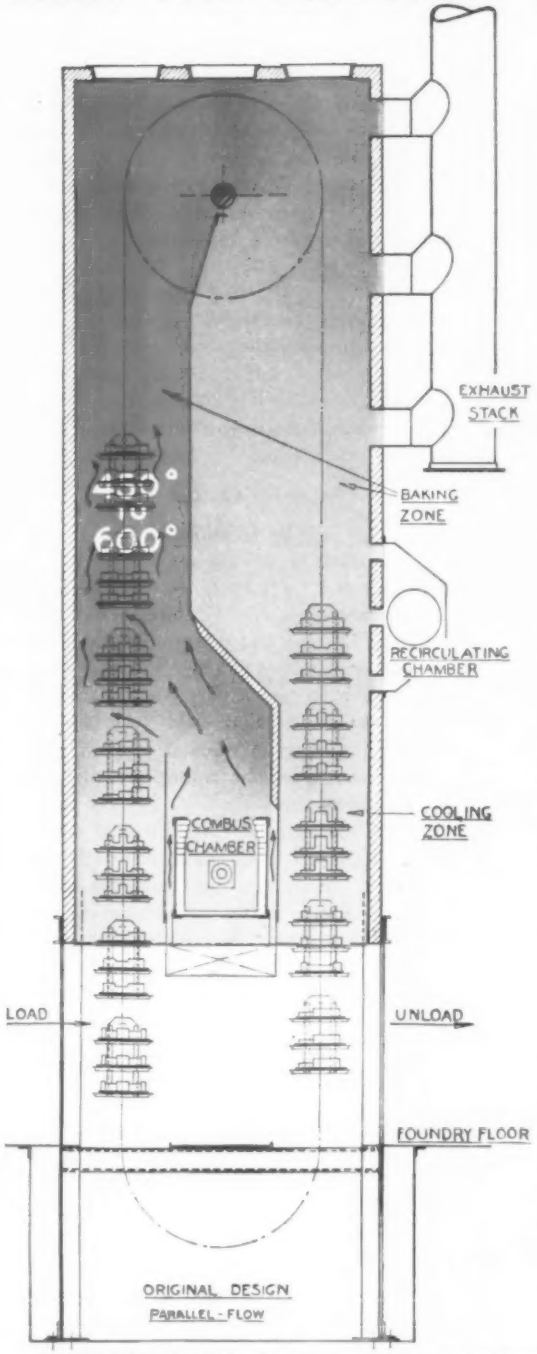
(*Continued from page* 100)

As reported in the November, 1946 issue of THE FOUNDRY, Louis J. Iadarola, the other shop practice engineer of the society, left in October to undertake the production of gray iron castings at Gilbertville, Mass. in partnership with a former associate. To fill the vacancy thus occasioned, Homer S. Cozad, formerly metallurgist, Iowa Malleable Iron Co., Fairfield, Iowa, has now become a shop practice engineer. A graduate of Parsons College, Mr. Cozad left Iowa Malleable for commissioned military service in the South Pacific. After leaving the armed forces, he engaged in engineering work at Los Angeles, but in February joined the Malleable Founders' organization.

The laboratory, shop practice and metallurgical service of the society is supervised by the consulting engineer who spends part of his time at the Society's main office, part in the laboratory and part on field trips in the industry's interest. The laboratory testing and regular field inspection work is done by the two shop practice engineers. Normally their duties are alternated so that one is

(*Concluded on page* 210)

BRING YOUR CORE-OVENS UP TO MODERN CROSS-FLOW EFFICIENCY

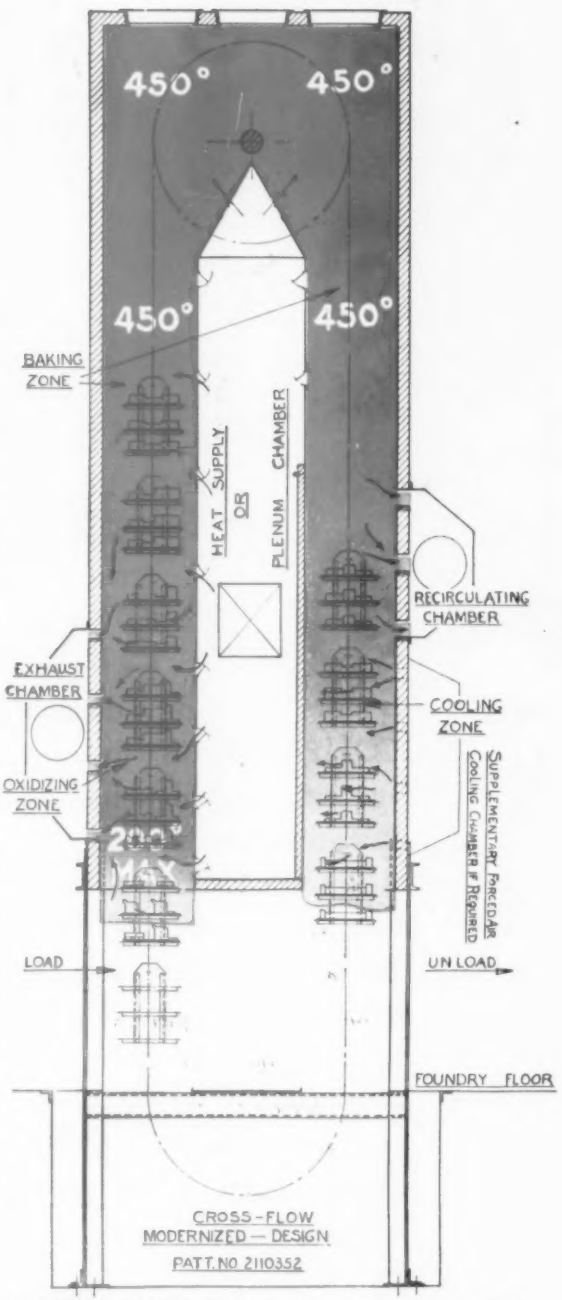


Cross-Flow Circulation and Recirculation for Batch or Continuous Ovens assures

Faster processing • More uniform baking • Better heat penetration • Less rejects • Closer temperature limits.

Oven ventilation is based on a parallel and cross-flow system. In the evaporating zone, care is exercised to keep the temperatures at a point that steam globules are not generated and retained within the body of sand after the surface is dried. In this zone, rapid circulation is provided at a soaking temperature, and directed so that the bases of the cores are dried at the same speed as the tops. Circulation is induced and controlled through fans and operating louvres.

After evaporation is completed the cores are subjected to a rapid heat, starting the oxidation of the oil binder. Oxidation is continued to the cooling zone. Through recirculation of heat, the fuel cost of operating the oven is at a minimum.



PLANT ENGINEERING: *Consulting assistance in plant layout to coordinate departmental operations, our experience dated from 1917 in this field.*

Such plant layout may be based on increasing production beyond present capacity, or it may be a rearrangement in this post-war period when operations are conducted under a new set of conditions.

MOTOR CLEANING EQUIPMENT: *Washing machines for cleaning tear-downs. Kerosene spray or similar solvent usually used as the cleaning medium.*

FORMED COWLINGS, PANELS, ETC.: *To your specifications, and of light metal alloys as required. Weldments and brazed assemblies may be under controlled atmosphere.*

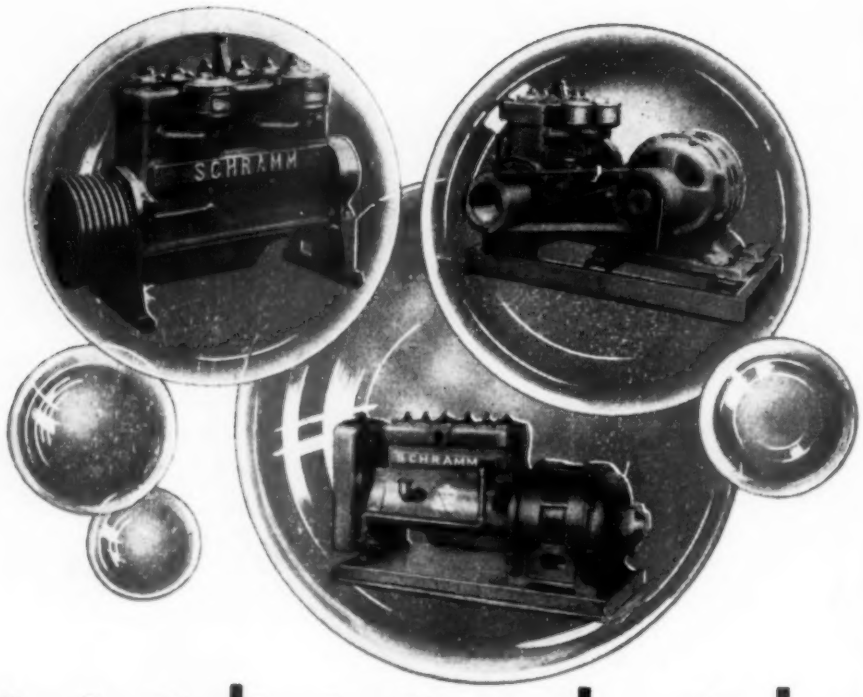
PILOT EQUIPMENT: *Sample size equipment for development of heavy equipment.*

VERTICAL CORE BAKING OVENS • CONTINUOUS HORIZONTAL BAKING OVENS • BATCH TYPE CABINET OVENS • DRAWER OVENS

DETROIT SHEET METAL WORKS, 1270 OAKMAN BOULEVARD • DETROIT 6, MICHIGAN

DETROIT SHEET METAL WORKS

DETROIT -6- MICHIGAN



packaged air

is more than a pipe dream. SCHRAMM COMPRESSORS, for example, package air every day for industrial consumption. The selection of SCHRAMM AIR COMPRESSORS is influenced by features that include: (1) 100% water cooled; (2) forced feed lubrication; (3) mechanical intake valve; (4) compact, lightweight. Designed for heavy duty, continuous service and minimum attention. There's a SCHRAMM AIR COMPRESSOR for your every need, in sizes ranging from 2 to 600 cubic feet displacement.

SCHRAMM

INC.

THE COMPRESSOR PEOPLE

WEST CHESTER, PENNSYLVANIA

(*Concluded from page* 208)

in the laboratory while the other is in the field.

During field calls to member companies the shop practice engineers check hard iron castings for soundness, test the toughness of the plant's current product and select at random a quantity of bars from those which have been produced since the previous visit. The bars selected are later tested at the society's laboratory and reported to the member. Also during the visits, the shop practice engineers discuss any plant problems with the member company's operating organization. If required, samples are taken back to the society laboratory for microstructural examination, report and recommendation.

Approve Control Testing

It is not to be inferred that member companies do not possess competent technical and operating personnel and laboratory facilities. The member company organizations are well qualified and their equipment is excellent. Years of experience, however, have indicated the value of the co-operative field visits and central testing even when it supplements or duplicates regular testing by the member company.

While the shop practice engineers are engaged in field visits and laboratory work, the consulting engineer devotes considerable time to advising members in response to their written or phoned inquiries dealing with metallurgical and plant operating problems. In addition, he prepares and issues bulletins on subjects pertaining to metallurgical and plant operations, also preparing material for and conducting shop practice meetings in various sections of the country on such subjects as gating and feeding practice, malleable melting methods, malleable annealing equipment and practice, and many others.

In addition to being unique in its long established continuity and value to members, the Malleable Founders' Society's laboratory, shop practice and metallurgical service is noteworthy, not only because of its service to members but because of the safeguards of quality, exercised in the interests of all users of malleable iron castings. The consulting engineer is responsible for this program, to the society's Committee on Research and Product Improvement, and works in close collaboration with the society's Technical Council on technical projects of interest and value to the industry.

E. G. Henry & Co., temporarily located at the Cleveland Pneumatic Tool Co. plant, 3781 East 77th St., Cleveland, will act as distributor in the Cleveland area for that company.

LARGEST STOCKS OF FOUNDRY SUPPLIES IN THE EAST *for immediate delivery!*

And we are underlining *immediate delivery*. Chances are excellent that if you phone now, what you need can leave here tonight . . be with you . . or well on its way to you . . this time tomorrow.

CHAPLETS . . all styles
SEA COAL FACING
PITCH CORE COMPOUND
NON-SILICA PARTING
TRIPOLI PARTING
PARTEX (walnut shell parting)
BENTONITE
BINDARENE
PENCO CEREAL BINDER
STEEL SHOT . . all sizes
STEEL GRIT . . all sizes
LADLE BOWLS, SHANKS
KORITE CORE PASTE
SHOVELS, RIDDLES
SKIM GATES, BRUSHES
REFRACTORIES
PATTERN SHOP SUPPLIES
SILVER LEAD FACING
CORE BLACKING
PLASTIC IRON
NO VEIN COMPOUND
DELTA CORE WASHES
FOUNDRY SANDS
CRUCIBLES
FOUNDRY MACHINERY
PERMI BOND
BONDITE
CUPOLA FIRESTONE
CORE OIL
FLASKS

As you know only too well, what is enumerated here represents but an infinitesimal part of what is required in a foundry, but we are making a brave stab at the subject in the hope that . . you'll sense that . . We probably have a dozen items left unmentioned for every one listed. And on that score, you'll be close to fact.

Put us

to a test

Phone JEFFERSON 5-1012

PENNSYLVANIA FOUNDRY SUPPLY & SAND CO.
Ashland and E. Lewis Street **Philadelphia 24, Penna.**

Industry BRIEFS

HARRY Ferguson Inc., 15020 Woodward Ave., Detroit, plans to move into the former Cleveland Pneumatic Aerol plant, 20001 Euclid Ave., Euclid, O. Company will subcontract as many orders as possible in the Cleveland area for 400,000 lb of gray iron, malleable iron and aluminum castings needed to turn out 400 tractors monthly, which is the company's beginning production quota.

° ° °

Tracy & Potts, 1117 Citizens Bldg., Cleveland 14, foundry pricing advisers, has been recently organized by John I. Tracy, for several years OPA foundry price specialist, and William B. Potts, OPA accountant. The organization furnishes a new type of service designed for the needs of smaller jobbing foundries in Ohio and adjoining states.

° ° °

Belmont Foundry Inc., Belmont, Calif., a new organization, has acquired the light metals foundry formerly known as the Clarkson Co. and previously operated by the Dalmo Victor Co. Plant is located at 1700 El Camino Rd., Belmont, and is producing magnesium and aluminum castings. E. L. Bloomster is vice president and general manager of the firm. W. C. Tait, president of W. C. Tait Co., San Francisco, is also president of Belmont Foundry.

° ° °

Dunrite Industries Inc., Commercial & Ninth Sts., Manitowoc, Wis., a general foundry business started over two years ago, has been incorporated by John B. and Muriel K. Peaslee and Maurice B. Van Elgel. Capital stock of 250 shares at $100 per share par value has been authorized.

° ° °

Sales of foundry equipment in February were 521.9 per cent of the 1937-1939 monthly average, according to the Equipment Manufacturers Association. Sales were 513.4 in January and 432.8 in Feb., 1946.

° ° °

Howard Foundry Co., Pacific Coast Division, 1985 East Sixteenth St., Los Angeles 21, has purchased the Steel Foundry Division of Equipment Engineering Co. and Northrop Gaines Foundry, both of Los Angeles. The Pacific Coast Division offers magnesium, aluminum (both sand and permanent mold) brass and steel alloy castings and wood and metal patterns.

° ° °

Anbar Inc., 1920 S. Western Ave., Chicago, a brass and aluminum foundry formerly owned by Protectoseal Co., recently was purchased by John Monaco, and is now being operated under the new name of Anbar Foundry, with office at 2011 S. Western Ave., Chicago 8. The company's business is being expanded to include production of permanent mold castings. Mr. Monaco continues as a partner in the Monaco Metal Foundry, a brass and aluminum shop at 1114 W. Hubbard St., Chicago.

° ° °

Brumley-Donaldson Co., 116 New Montgomery St., San Francisco 5, dealers in industrial materials, has been appointed national sales agent for the Lone Star Steel Co. of Daingerfield and Dallas, Tex., who recently purchased the Daingerfield pig iron and coke facilities built during the war. Productive capacity of this plant is 1200 to 1400 tons of foundry pig iron and 1200 tons of coke daily.

° ° °

F. Grote Mfg. Co., 163 Third Ave., Evansville, Ind., gray iron foundry and elevator manufacturer, has formed a working affiliation with Murphy Elevator Co., 128 East Main St., Louisville, Ky. Under the agreement the Murphy company will provide management for the Grote company which, in turn, will do factory work for the Louisville concern.

° ° °

H. F. Dick, co-owner of Columbia Steel Casting Co., 734 Northeast 55th Ave., Portland, Oreg., has purchased for $105,000 from War Assets Administration a surplus steel casting plant on property adjoining that of Columbia Steel Casting Co. Purchase includes land, buildings, trackage, fences, two small motor generators and three cranes.

° ° °

Centrifugal Casting Co., 3454 Pine Ave., Long Beach, Calif., has obtained building permit for construction of a foundry building at 3521 Cherry Ave., Long Beach. The galvanized iron structure will be 40 x 120 ft and will cost about $14,000.

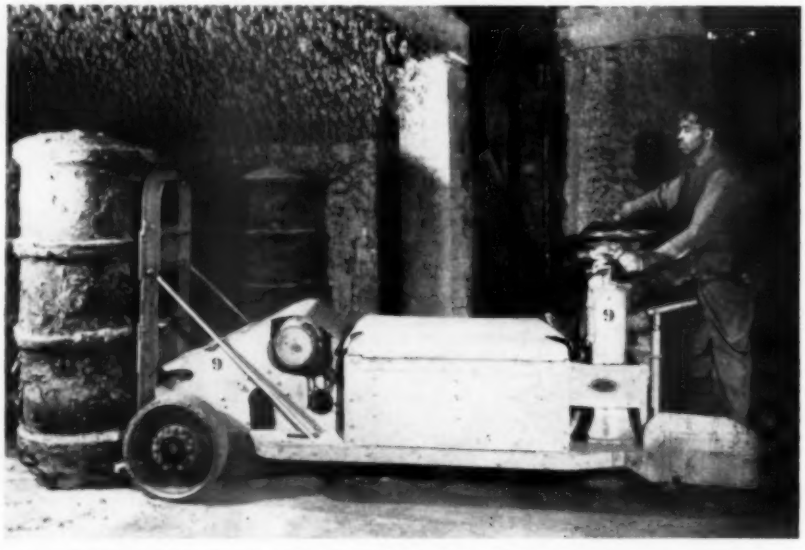
° ° °

Lahmann Pattern Works, 702 Virginia Ave., Indianapolis, was partially destroyed by fire recently. The roof and upper story of the building are being replaced. Operation of the shop was not interrupted.

° ° °

Gray iron casting production for February in the Philadelphia Federal Reserve district decreased 4.1 per cent from January but was 17.8 per cent above that of

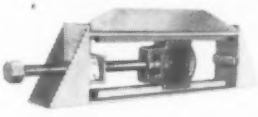
(*Continued on page* 214)



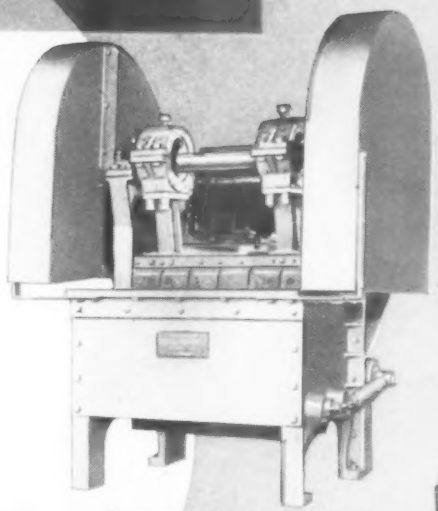
CHARGING TRUCK: This view in the annealing department of the Erie Malleable Iron Co., Erie, Pa., shows the company's method of handling annealing pots. The storage-battery-powered fork truck carries a load of approximately 3500 lb in charging each of these pots in the annealing oven and later removing them. A small platform placed over the forks converts the truck for use in handling skid boxes in the annealing department

The NEW WAY to go....

TOWARD FOUNDRY PROFITS



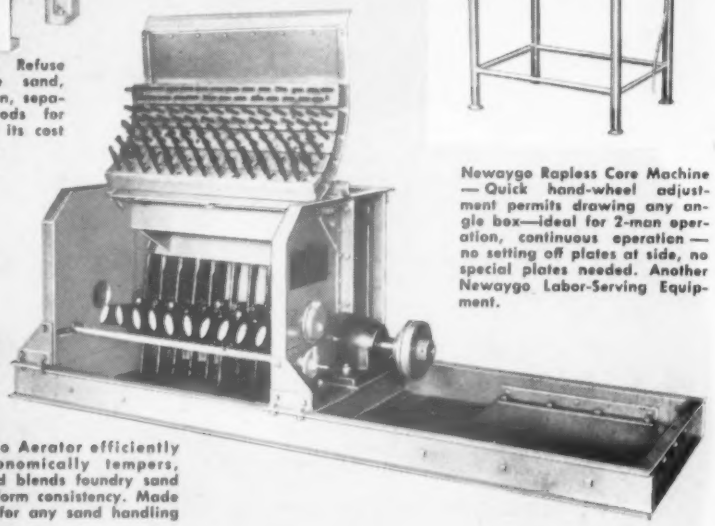
Newaygo Conveyor and Elevator Take-Ups—Self-aligning Roller, ball or plain bearings, for all standard shafts, 6" to 36" travel.



Newaygo Mill cuts costs for large users of sand. Salvages sand lumps from screens, separates non-magnetic tramp material and metal which escapes magnetic separator. All lumps reduced to proper grain size. Provision for eliminating float dust. For systems up to 120 tons per hr. for shake-out sand.

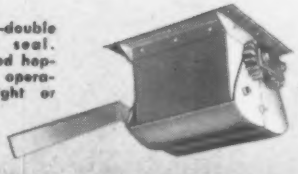
Newaygo Foundry Turntable —Standard sizes 8' to 24'. Segmental construction. Interchangeable gear sections. Variable speed drive. Underpan with plows handles spillage through grates.

Newaygo Core and Refuse Crusher recovers core sand, slag for iron reclamation, separates gaggers and rods for re-use. Quickly returns its cost in salvaged core sand.

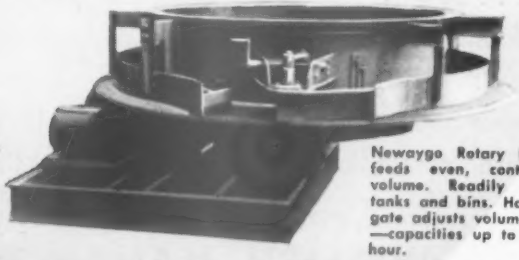


Newaygo Rapless Core Machine — Quick hand-wheel adjustment permits drawing any angle box—ideal for 2-man operation, continuous operation — no setting off plates at side, no special plates needed. Another Newaygo Labor-Serving Equipment.

Newaygo Aerator efficiently and economically tempers, cools and blends foundry sand to a uniform consistency. Made in sizes for any sand handling system.



Newaygo Sand Gates—double undercut type. Tight seal. Available for all bins and hoppers. Geared for easy operation. Hand, counterweight or air operated.



Newaygo Rotary Plate Feeder feeds even, controlled sand volume. Readily attaches to tanks and bins. Hand crank on gate adjusts volume. Two sizes —capacities up to 75 tons per hour.

MANUFACTURERS ASSOCIATION INC. FOUNDRY EQUIPMENT

NEWAYGO ENGINEERING CO.

NEWAYGO, MICHIGAN

THE New Way LINE

Sand handling, cooling and conditioning equipment, mold conveying systems, reclaiming units, rapless core drawing machines.

SALES OFFICES:

CHICAGO, ILL.	PITTSBURGH, PA.	LONG ISLAND, N. Y.	DETROIT, MICH.	CAMBRIDGE, MASS.	PHILADELPHIA, PA.	CINCINNATI, OHIO
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IRVING 1451	LE HIGH 1928	IRONSIDES 62-600	TYLER 53338	ELLIOT 7958	RITTENHOUSE 69288	CHERRY 2422

TYPE CS, illustrated above, is priced at $270.00 complete, and is one of several available types.

Ask Your Supplier to Quote on a Combs Great Western Riddle

We are far from satisfied with the delivery dates which we are constrained to quote on Combs Gyratory Riddles . . . however, we DO suggest that you check with your foundry supply house or with us direct for a quotation . . . we're really not doing too badly. A good riddle *will* save a lot of man-hours and Combs Riddles have always been a real, labor-saving investment in the foundry.

MADE ESPECIALLY FOR FOUNDRY USE BY

GREAT WESTERN MANUFACTURING CO.

LEAVENWORTH, KANSAS

★

COMBS GYRATORY FOUNDRY RIDDLES

(*Continued from page* 212)

February, 1946, according to the University of Pennsylvania's Industrial Research department. Malleable iron production was down 7.8 per cent from January but 25.9 per cent over that of February, 1946. Steel casting production was 17.5 per cent below January; but was up 292.7 per cent from the strike-depressed level of a year ago. Nonferrous casting production in February was the same as in January but was 209.6 per cent larger than in February, 1946.

° ° °

Pittsburgh Lectromelt Furnace Corp., 301 32nd St., Pittsburgh 30, recently completed arrangements with Stein et Roubaix, Paris, France, for manufacture of Lectromelt furnaces in France. Associates of Stein et Roubaix in Belgium will manufacture the furnaces for Belgium and its colonies. Arrangements have also been concluded with General Electrica Espanola, Bilbao, Spain, for Spanish manufacture.

° ° °

Fidelitone Stampers Inc. has been formed in Los Angeles county, with 250 shares of no par value capital stock, to manufacture and design metal dies, stamps and castings. Directors are Meldon Rodney, Robert Butler and Velma Rodney.

° ° °

Columbiana Pump Co., 131 East Railroad St., Columbiana, O., has added 3000 sq ft to its foundry floor space. Completion of other improvement program details will increase company's production capacity about 40 per cent.

° ° °

Fountain Foundry Co., Veedersburg, Ind., has completed plans for an addition to its molding facilities. This will constitute the second enlargement for this foundry since its inception approximately one year ago.

° ° °

Keystar Castings Corp., 4850 Warner Rd., Cleveland, is being built by Russell W. Stumpf and Wesley C. Keplinger to manufacture aluminum castings. Building covers 4000 sq ft.

° ° °

Gray Iron Foundry Co., 1607 Ridgely St., Baltimore 30, is moving its Charlotte, N. C., foundry from 1418 Stateville Ave., into a new and larger building recently completed in Charlotte.

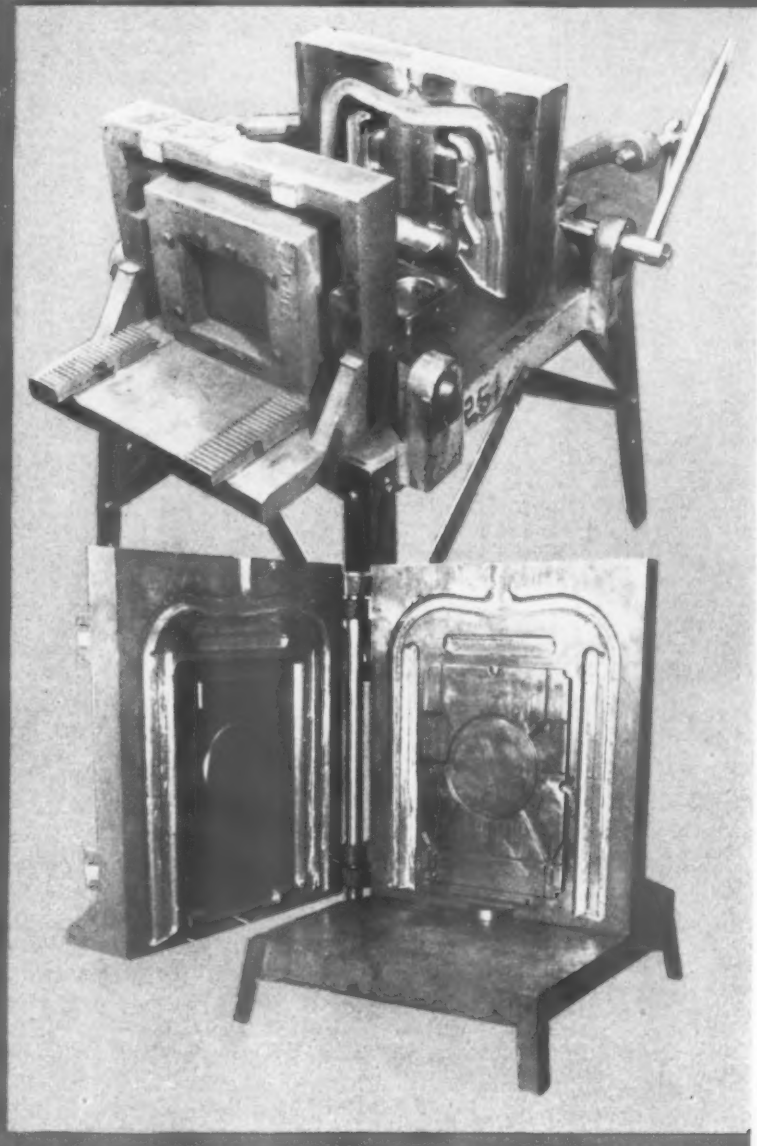
° ° °

Balmor Corp., Union Ave. and Clipper Rd., Baltimore, engaged principally in the manufacture of operating devices for steam locomotives, is doubling its electric steel foundry capacity. Company recently established a new department to produce equipment for the prefabricated

(*Continued on page* 216)

PERMANENT MOLDS

FOR HIGH PRODUCTION ECONOMY



The Permanent Mold System of producing Aluminum Casting may be the answer to your production problem. In many cases permanent molds can greatly decrease your production costs and still produce finished castings which are far superior to those made by any other system.

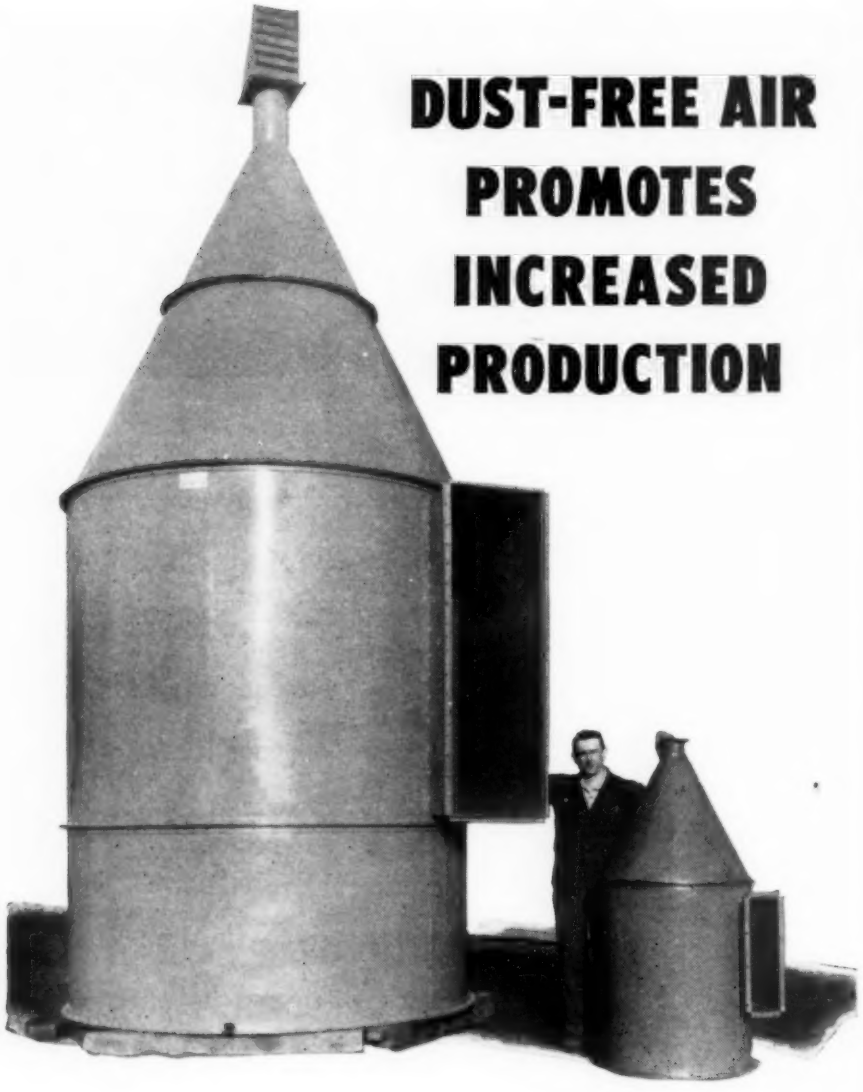
QUOTATIONS
AND FURTHER DETAILS
ON REQUEST

MASTER PATTERN COMPANY

1315 MAIN AVENUE — CLEVELAND 13, OHIO

DESIGNERS AND MANUFACTURERS OF PERMANENT MOLDS, WOOD AND METAL PATTERNS AND MODELS

DUST-FREE AIR PROMOTES INCREASED PRODUCTION



● Dust-free air is an important factor in worker's efficiency. Respirators and masks are a nuisance and prevent men from putting forth their best efforts.

The simplest, surest and most satisfactory way to solve a dust problem is by installing Morse Rarefied Collectors on dusty operations. We make them in a wide range of sizes. The large unit shown here will handle 16,000 C. F. M. of heavy dusts. The small one will handle 1100 C. F. M.

Goergen-Mackwirth collectors are highly efficient. Their first cost and maintenance is low. They are self-dumping. No cleaning is necessary. There are no replacement bags, plates or oil spray. The only electric current required is for the fan motor.

Write for complete information

Goergen-Mackwirth
ENGINEERING CO., INC.
813 Sycamore Street Buffalo 12, N. Y. Phone: Cleveland 6661
SPECIALISTS IN THE MOVEMENT AND CONTROL OF AIR

(*Continued from page* 214)

housing industry. J. M. Merkle is president and T. J. Atkinson is secretary-treasurer.

° ° °

Summit Pattern Works, Greensburg, O., manufacturer of cabinets and patterns, is planning to build a new plant and install additional equipment and machinery. Officers of the recently incorporated company are M. G. Baab, president; W. D. Sayre, vice president, and F. Fosnight, secretary-treasurer.

° ° °

Standard Machine & Mfg. Co., recently at 4125 East Tenth St., Indianapolis, has moved into its new foundry building at 1433 North Sherman drive. Edward J. Mock is president of the company which makes steel truck wheels and other castings.

° ° °

Cottrell Casting Co., 2429 East Artesia St., Long Beach, Calif., is the firm name under which Calvin G., George B. and James H. Cottrell Jr., and Stephen H. Sims have published a certificate that they are conducting business.

° ° °

Anderson Stove Co. Inc., 120 West Vinyard St., Anderson, Ind., has purchased the government's surplus war plant at Anderson in which General Motors Corp. manufactured aluminum cylinder heads.

° ° °

Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, has opened a technical office at Sao Paulo, Brazil, under managership of Reuben P. Rudy, company representative in Brazil the last two years.

° ° °

Patbard Casting Co., 1108 Olds Tower Bldg., Lansing, Mich., has been formed by Walter F. Patenge as a general foundry and machine business with capital of $50,000.

° ° °

Parker Pattern & Foundry Co., Sycamore Ave., Pasadena, Calif., is being operated by John C., Harvey K. and Herbert D. Parker and Minton Cronkhite.

° ° °

Allegheny Foundry Co., 915 Behan St., Pittsburgh, suffered fire damage estimated at $10,000 to its office building and warehouse Mar. 4.

° ° °

Tucker Bros. Foundry, 11821 Alameda St., Los Angeles, has obtained approval for construction of a $4000 addition to its foundry building.

° ° °

Foundry Engineering Service, 344 Fourteenth Ave., Moline, Ill., has been organized recently to offer a pattern engineering service as a means to complete

(*Concluded on page* 220)

Winning Better Castings Must Start in Cupola!

To insure sound, dense-grained castings and avoid hollow centers and other causes of make-overs, you must make sure that your molten metal is thoroughly cleansed of foreign matter before cupola is tapped. To each and every charge of iron, add a little—

Famous CORNELL CUPOLA FLUX

For a fraction of a penny per average size casting, you will pour definitely better castings.

Leading foundries have been using Famous Cornell Cupola Flux regularly—for years.

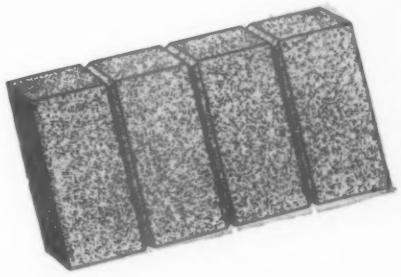
CLEAN CUPOLAS, CLEAN DROPS—another definite result of using this Famous Cornell Flux. A glazed or vitrified surface which greatly reduces adherence of metal and slag, is formed on brick in melting zone. Brick lasts longer and maintenance cost is cut amazingly.

Write for Bulletin 46-B

The CLEVELAND FLUX Company

1026-1036 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Brass and Aluminum Fluxes Since 1918



EXCLUSIVE SCORED BRICK FORM

Saves time and labor. You can flux a charge of iron in a few seconds—correctly. Simply toss one brick into cupola for each ton charge of iron or break off a briquette (quarter section) for each 500 pound charge. Famous Cornell Cupola Flux does not blow out with the blast STAYS in melting zone until entirely consumed—no waste.

FAMOUS CORNELL FLUXES
Trade Mark Registered

Write for Bulletins

Famous CORNELL ALUMINUM FLUX

Produces clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections are poured. Castings take a higher polish. NO FUMES! Exclusive formula prevents obnoxious gases. Metal does not cling to dross.

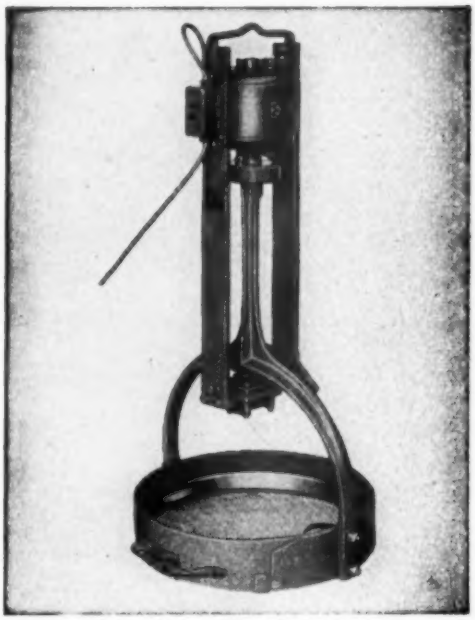
Famous CORNELL BRASS FLUX

Makes metal pure and clean, even when dirtiest brass turnings or sweepings are used. Produces castings which withstand high pressure tests and take a beautiful finish. Saves considerable tin and other expensive metals. Crucible and furnace linings are preserved.

Famous CORNELL LADLE FLUX

Place a few ounces in bottom of ladle, then tap cupola. Metal is thoroughly cleansed, foreign impurities are easily skimmed off. Ladles are kept clean, there is less patching and increased ladle life. Metal temperatures are retained during transfer to molds.

FEDERAL'S LOWE SIFTER



Save money by faster sifting, better sand conditioning with a Lowe Electric Sifter. Features: greater screening area, enclosed ball bearing motor, more shovelling room. Write for information. Prompt delivery.

FEDERAL JOLT MACHINES

Air operated, fool-proof jolt machines that ensure uniform cores. Sturdy cast iron construction with no external valves to wear out. Made in four sizes. Get our prices and deliveries.

"All Federal Products

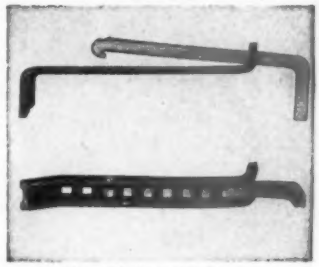
FEDERAL

RUBBER-COVERED SHOVEL HANDLES

The best insurance you can buy against damaged patterns, core boxes or flasks. The pean-shaped grip is ideal for ramming.

They will fit your present shovels or you can order your next shovels with them already installed.

The "Lightning" Clamp



The "Holdtite" Clamp

Federal offers two types of flask clamps.
The "Lightning" clamp is an eccentric type, requiring no wedges and available in two sizes: No. 2, 8" to 12" and No. 3, 12" to 20".
The "Holdtite" is an adjustable clamp designed for use with wedges and is also offered in two sizes: No. 1, 13" to 23" and No. 0, 18" to 33".
Both clamps made of sturdy malleable iron, rigidly reinforced to prevent distortion.

MEMBER

MANUFACTURERS' ASSOCIATION FOUNDRY EQUIPMENT

SWABS—We have eliminated the shortage of this essential item by making them ourselves. Federal swabs are made of the best flax, ample in size and won't fall apart. They're fully eighteen inches long and full-bodied. Shipped from stock — the supply is ample. Jobber inquiries are invited.

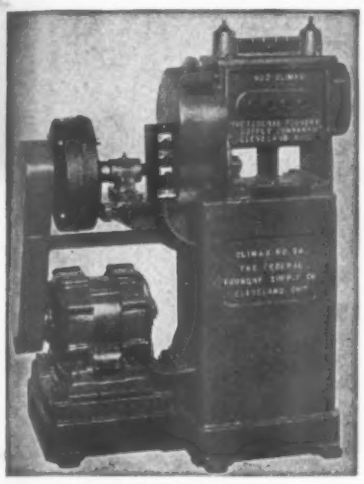
THE FEDERAL FOUNDRY

Seacoal Plant
CROWN HILL, W. VA. · CHICAGO · MILWAUKEE · DETROIT · ST. LOUIS

Chamberlain Co., Los Angeles, Calif. · Pacific Graphite Works, Oakland, Calif. · LaGrand Industrial Supply Co., Portland, Ore.

Are Sold with Service"

SUPPLIES



CLIMAX WIRE STRAIGHTENERS

Any foundry, large or small, can cut production costs by straightening and re-using core wires and rods. With a Climax Wire Straightener this can be done quickly, economically, safely — by unskilled labor. A complete descriptive circular is yours for the asking.

TWISTED STEM CHAPLETS

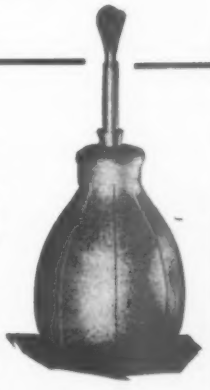
The chaplet with everything. The "Twisted Stem" promotes rapid complete fusion. Not deformed, the stem has no weak spot to burn in and permit core shift. Made in a complete range of sizes. Samples of the size you use, gladly submitted.

FEDERAL'S WONDER CUTTERS

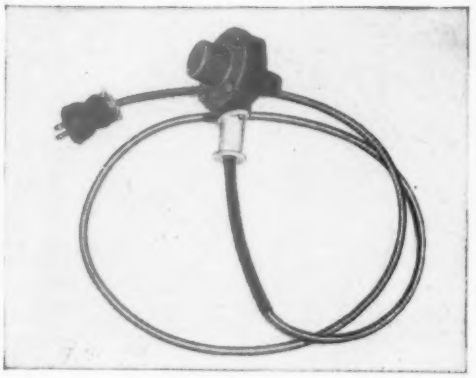
Two compact cutters for rods and band iron. One cuts up to 5/8" round and the other to 7/8" round. Readily mounted on any bench. Users say they're worth their weight in gold!

WATER BRUSH

Easy to Grip and Hard to Tip. It can't leak and one filling lasts all day. Does not tire the molder's hand.



FEDERAL NO. 2 VIBRATOR



A popular size electric vibrator, made in our own machine shop and carried in stock for immediate delivery. Hard-chromed piston guarantees long life. For 110 volt, 60 cycle, single phase operation. $15.60 each, f.o.b. Cleveland. A companion knee switch of our own manufacture is also carried in stock; $3.60 each f.o.b. Cleveland.

FEDERAL'S "VIBRA-DRAW" CORE DRAWING MACHINE

Cuts costs in your core room by making it easy for every core maker to draw perfect cores as fast as he can fill the core box, place it against the vibrating head and lift the box. Made in two styles: the floor model and the portable bench model shown below. Immediate delivery—write for details.

Y SUPPLY COMPANY · 4600 EAST 71st STREET CLEVELAND 5, OHIO

CHATTANOOGA, TENN. · ST. PAUL · NEW YORK · RICHMOND, VA. · UPTON, WYO.
Mines

Beaumont Cement Sales Company, Houston and Beaumont, Texas and Harvey, La. · Shanahan's Ltd., Vancouver, B. C.

NEW BUEHLER-WAISMAN

Electro-Polisher

—produces a beautifully polished surface on practically all metals and alloys—represents a new revolutionary approach for metallurgical specimen preparation.

- ★ The new Buehler-Waisman Electro-Polisher is a sturdy, stream-lined, laboratory instrument, designed for efficiency in performance.
- ★ Ferrous and non-ferrous metals can be prepared with equal speed and simplicity. Both large and small samples are readily accommodated.
- ★ Simple to operate—does not require an expert technician to produce good specimens.
- ★ Speed in operation—various specimens may be prepared in a fraction of the usual time required.
- ★ Economical—only a small amount of non-explosive chemical required.
- ★ Results are dependable — scratch free specimens, uniformly etched for true structure examination.

THE BUEHLER LINE OF SPECIMEN PREPARATION EQUIPMENT INCLUDES—CUT-OFF MACHINES • SPECIMEN MOUNT PRESSES • POWER GRINDERS • EMERY PAPER GRINDERS • HAND GRINDERS • BELT SURFACERS • MECHANICAL AND ELECTRO POLISHERS • POLISHING CLOTHS • POLISHING ABRASIVES

Buehler Ltd.

A PARTNERSHIP

METALLURGICAL APPARATUS

165 WEST WACKER DRIVE, CHICAGO 1, ILL.

(*Concluded from page 216*)

co-operation between the designer, the foundryman and the patternmaker. The firm is being operated by Leslie W. Johnson and Wayne C. Bates.

° ° °

Wisconsin Centrifugal Foundry, Butler, Wis., has been incorporated by Martin E. Nevin, Paul J. Schneider and Robert Buech to conduct a general foundry and machine shop business, including the production of centrifugal castings.

° ° °

Sandusky Foundry & Machine Co., Fulton & Market Sts., Sandusky, O., plans interior alterations to its factory which include increasing capacity of the existing three crane runways from 25 to 75 tons.

° ° °

Galion Iron Works & Mfg. Co., 200 South St., Galion, O., plans to build a 40 x 380 ft addition to their plant costing $60,000. New building will be on Clark St. in the plant area.

° ° °

American Art Alloys Inc., 1142 South Main St., Kokomo, Ind., has completed construction of its new 70 x 120 ft foundry building. The building will house both sand and permanent mold casting equipment for pouring aluminum-bronze castings.

° ° °

Sullivanware Co., manufacturers of aluminum kitchenware and permanent mold castings, has moved its plant from Hudson, Ind., to 244 West Main St., Danville, Ill.

° ° °

U. S. Die Casting Co., 144 North Maple Rd., Elyria, O., has been opened recently to make zinc and aluminum die castings. Edward Shally is head of the company.

° ° °

Como Mfg. Co. has been incorporated in Los Angeles county with capital of $5000 to manufacture all kinds of iron castings and machinery.

° ° °

San Fernando Foundry, 670 Arroyo, San Fernando, Calif., is being operated by Manuel Martinez, Senor G. Gamboa and Autur B. Aguirre.

° ° °

Ansonia Plumbing Mfg. Co., 36 Pleasant St., Ansonia, Conn., has changed its name to Kisluk Mfg. Co. Inc. as of Jan. 1.

° ° °

S. W. L. A. Foundry, 4610 West Compton Blvd., Lawndale, Calif., is being operated by Basil L. Gereaux.

° ° °

Moore Brothers Aluminum Foundry, Highway 6, Kendallville, Ind., was opened recently.

for more uniformly baked cores

your best bet is a MAEHLER CORE OVEN

. . . they're proved on the job

FOUNDRIES equipped with Maehler Core and Mold Ovens can reduce core baking time, produce more evenly baked cores, eliminate smoke in the core room and cut operating costs!

One of the big advantages of Maehler ovens is the recirculating air heat principle which assures exceptional heat uniformity (tests show uniformity within 10° F in a fully-loaded oven operating up to 500° F). This kind of temperature control means cores that are uniformly baked with no burning.

Here's what users say about Maehler Core Ovens

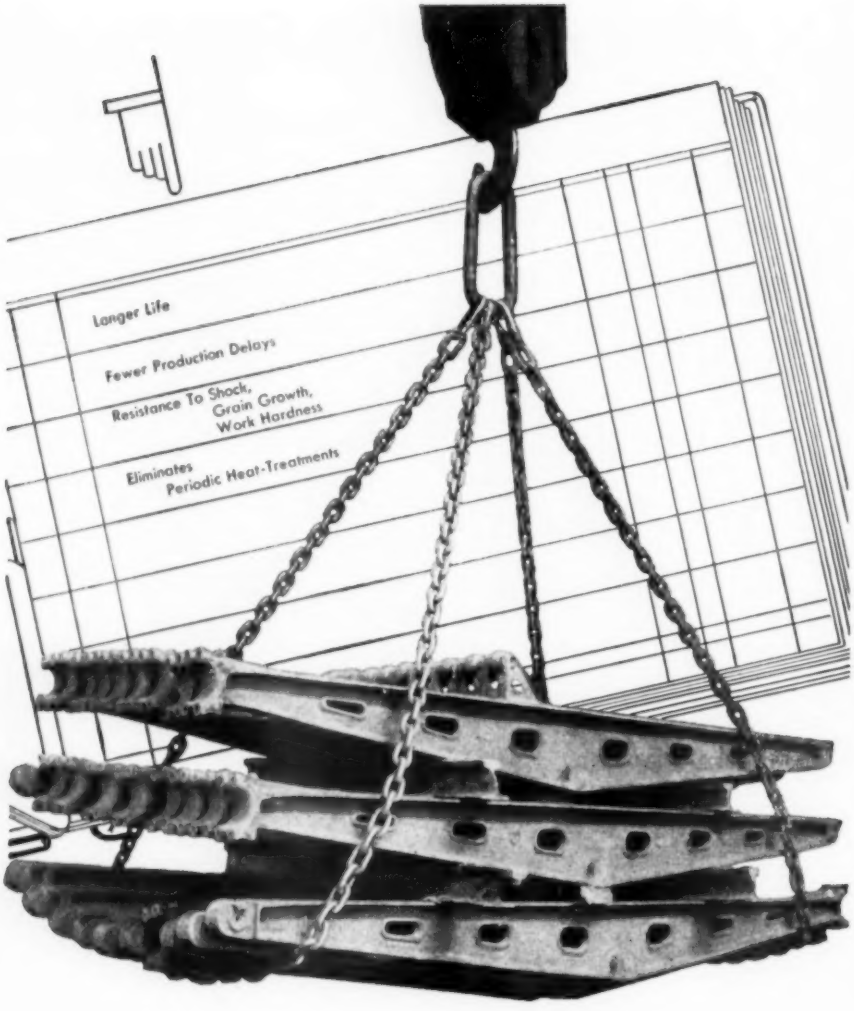
The Detroit Brass & Malleable Works reported that with their Maehler Recirculating Air Heat System on a six compartment metal oven they obtain perfect cores—have increased capacity and lowered costs.

After installing a Maehler Air Heat Oven, The Blackmer Pump Co. of Grand Rapids, Mich. reported baking time for small cores reduced 65%—for large cores 30%! ● ● ●

Maehler Core and Mold Ovens are available in a complete range of oil fired, gas fired and electrically-heated units.

· MAEHLER ·

THE PAUL MAEHLER CO., 2200 W. Lake Street, Chicago 12, Ill.



Are you getting these

HIDDEN PROFITS

in the chain you use?

Savings reflected from use of TAYLOR MADE Alloy chain are hidden profits. With twice the strength of ordinary chain you have fewer production delays. TAYLOR MADE'S longer life means less frequent replacement. Its terrific resistance to shock...grain growth and work hardness eliminates periodic heat-treatments—reduces operating and maintenance costs. Investigate TAYLOR today. Call your Mill supply distributor or write the factory direct.

S.G. TAYLOR CHAIN COMPANY
Dept. S-5, Box 509, Hammond, Indiana

TAYLOR MADE *Chain*

"THE BEST BY TEST SINCE 1873."

Modernizes Malleable Iron Foundry

(*Continued from page 77*)

stored on all-steel racks in an area adjacent to the molding units, and maintained here are facilities for pattern repair and flask alterations. Patterns not current are stored in another building. Coreroom, which already was modern and adequate in capacity, is located in a separate wing of the main foundry building.

A new sand preparation system is installed in one corner of the malleable foundry closest to the storage yard. New sand as required is brought in from the storage yard by lift truck with self-tipping steel tote boxes. This sand is dropped onto a grating at floor level to enter a bucket elevator which carries it to an overhead storage bin. Used sand from three shakeouts goes into an oscillating conveyor, thence onto a belt with magnetic roll which removes small pieces of metal and drops them into a tote box, and then proceeds to a 14 x 8-in. bucket elevator. From the elevator the used sand passes over a revolving screen and then into the storage bin. Tailings from the screen drop down a chute into a tote box.

Sand Prepared and Tested

A 42-in. apron conveyor belt under the storage bin transfers sand into one of two mullers, an operation which is timed electrically in proper cycle to discharge into the muller one batch of 1¼ tons, or about 25 cu ft. Muller is timed to rotate one minute in which period water is added and the sand is stirred to proper consistency before being discharged automatically below floor level to a 42-in. prepared sand belt. From the latter the sand is transferred to a 14 x 8-in. bucket conveyor to enter a revivifier for fluffing up and aeration before being deposited on the main prepared sand delivery belt, whence it moves to the 24-in. distributing belts feeding the molders' hoppers. Every batch of sand is tested for moisture and permeability.

Whereas in the former malleable foundry pouring operations involved considerable manual work, such as pushing ladles by hand, the new setup mechanizes every operation that lends itself to modern mechanical handling. A T-shaped tramrail loop about 95 ft wide serves the two air furnace tap holes and extends out 95 ft to deliver hot iron to the

(*Continued on page 224*)

IT'S ALWAYS FAIR GRINDING WEATHER WHEN YOU USE Sterling INTERNAL WHEELS

Sterling Internal Grinding Wheels, available in special vitrified and resinoid bonds, have the proper grain sizes to finish expertly the surfaces of straight, cylindrical, tapered or formed holes. The operation is accurate, economical, and results in a better-than-ordinary surface.

Holes can be finished with these wheels to within limits of 0.001-inch and, if required, to 5 to 10 micro inch finish! Selecting the proper wheel for your particular job will provide you similar close tolerances.

What is your internal grinding problem? A wide choice of Sterling Wheels is available to solve it. Sterling engineers, skilled by experience on hundreds of internal jobs, will gladly work with you to attain better grinding at less cost.

• STERLING ABRASIVES •

THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

(*Continued from page 222*)

three pouring platforms. Metal is tapped from the furnace into a 2000-lb bull ladle lined down to 1500 lb capacity and this is moved to the pouring platforms by electric trolley.

Each of the three molding units is served by a carousel-type mold conveyor approximately 135 ft long, with an elevated power pouring platform about 36 ft long at one end. From the bull ladle, hot iron is transferred to 150-lb pouring ladles suspended from a tramrail track loop. With the power pouring platform traveling at the same speed as the mold conveyor, workmen pour the molds with little effort. The floor between the pouring platforms is vitrolite brick containing fireclay.

After being poured, the molds go under a fan-ventilated hood which removes obnoxious fumes and provides accelerated cooling of the molds. Three risers in the 135-ft long hood exhaust the hot gases and dissipated heat to air. Fig. 1 shows molds being poured and entering the hood, also a pouring ladle being filled from the bull ladle.

Emerging from the cooling hood and moving to the far end of the three carousel conveyors, molds approach the shakeouts set at floor level and hooded. As the conveyor begins the 180° turn, cams progressively elevate the conveyor plates to cause the molds to tip off onto the shakeout. Bottom boards are held on the conveyor plates by seven 2-in. square pegs welded onto the inside edge plate. Dust from the shakeouts is exhausted and removed in a hydrostatic wet-type collector. Fig. 2 shows a rear view of a shakeout with sand mullers and dust collector in the background.

From the shakeouts, castings are deposited on apron conveyors beneath the floor and emerge to travel from 40 to 96 ft to a cooling hood to receive accelerated cooling. From the hood the castings move on the conveyor to men who do the spruing on the conveyor. Sprues are thrown into charging boxes to be remelted and the castings are unloaded onto a secondary conveyor running at right angle where they are chipped, inspected and sorted. Here, as shown in Fig. 5, the castings are removed from the conveyor and placed in steel skid tote boxes to go to the annealing furnaces.

Annealed In Electric Ovens

The annealing department is located in an area adjacent to the castings sorting and inspection conveyor and at present has three elevated electric ovens and space for a fourth. Each oven has a high-heat and a low-heat chamber, the two being side by side. Removed from tote boxes, the castings are packed into circular high-alloy baskets, the packing being performed carefully to minimize warping of the castings during the heat treating operation. The loaded baskets are then stacked on an oven car, as shown in Fig. 3, and the car is rolled under an oven and lifted by electric hoist equipment into the high-heat, or heat treating, chamber to remain for 12 hours.

Exceptional care and constant temperature throughout the period in the high-heat chamber produces A-grade mallable by short-cycle anneal. At the end of the 12 hours the car is lowered, rolled sidewise a few feet and lifted into the low-heat, or cooling chamber, to remain another 12 hours.

Removed from the low-heat chamber at the end of this period, the castings are air cooled and transferred into one of two airless blast units for cleaning. One of these units is shown in Fig. 6. All handling of baskets and castings around the ovens and cleaning equipment is performed by an electric tramrail system.

From the cleaning units, the castings, loaded in tote boxes, are moved to a battery of six high-speed single wheel grinders for the finish grinding opera-

(*Concluded on page 226*)

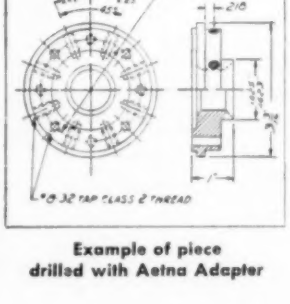
Precision Adapter for Drill Presses Perfects Alignment—Prevents Drift!

The new Aetna Adapter, of aluminum alloy, fits the columns of most small drill presses—assures accurate milling and accurate deep hole drilling—without a drill jig. It firmly and accurately holds interchangeable drill bushings close to work.

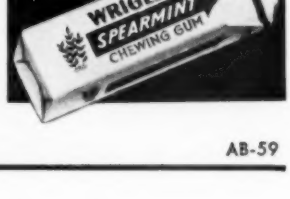
Precision alignment is accomplished through an eccentric aligning bushing, which once set needs no further adjustment. Filler bushings cover the entire bushing range up to ½". Stops to locate the piece to be drilled, are attached to the press table or directly to the adapter. Milling chatter is avoided. Chip interference is eliminated. Overlapping holes can be drilled without punch marks, or indication of run-out, with drills as small as 1/32" diameter. ¼" holes can be drilled more than 6" deep with as little as .006" drift.

Accuracy in work is achieved best by alert workers. That's why many plant owners make chewing gum available to all. The chewing action helps relieve monotony—helps keep workers alert, aiding them to do a better job with more ease and safety. And they can chew Wrigley's Spearmint Gum right on the job—even when hands are busy.

You can get complete information from Aetna Mfg. Co., 250 Chicago Ave., Oak Park, Ill.



Example of piece drilled with Aetna Adapter



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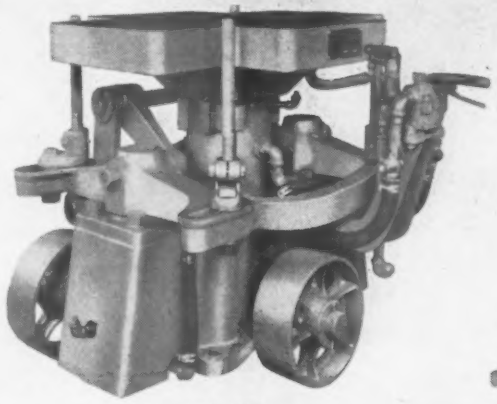
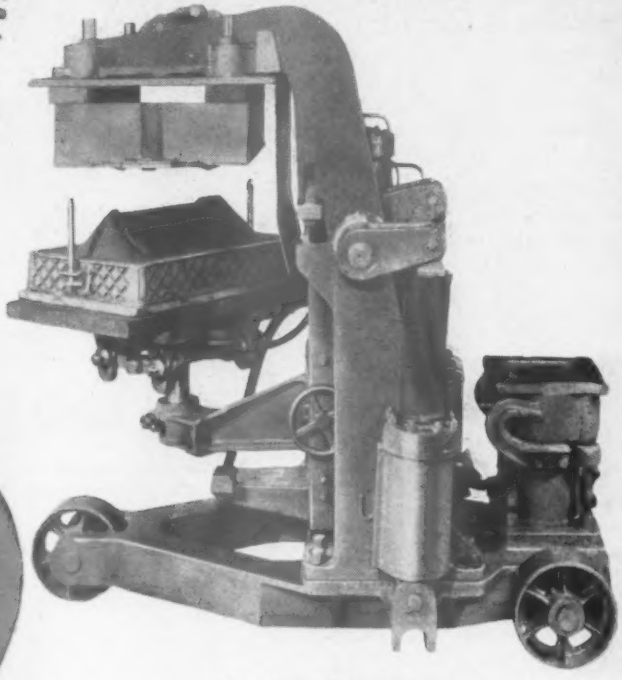


No. 681-C
Portable Jolt Stripper



No. 612 Portable
Jolt Roll-Over Pattern Draw

Pace Setters

A COMPLETE LINE PROVEN IN SERVICE INCLUDING—

PLAIN AIR JOLTS
in 12 different sizes

JOLT SQUEEZERS
fast sturdy machines—3 sizes

JOLT STRIPPING PLATES
4 sizes ranging up to 16" draw

JOLT, SQUEEZE, STRIPPING PLATE AND PATTERN DRAWS
Popular for medium service —2 sizes

PORTABLE JOLT ROLL-OVER AND PATTERN DRAW
A heavy duty thoroughly dependable machine—portable

JOLT ROLL-OVER AND PATTERN DRAWS
Fast large capacity machines with roll-out conveyors—4 sizes

Write for fully descriptive catalog giving complete specifications.

● Speed up your production and keep competitive with Johnston & Jennings molding machines. The No. 681-C jolt stripper pictured above—furnished portable or stationary—features a valve-less, shock-less, jolt free from rebound, a positive draw, speed of which is variable to meet different conditions,—and complete enclosure of all working parts, thus assuring years of efficient trouble-free service.

The No. 612 Portable Jolt Roll-Over is designed specially for work requiring absolute accuracy in ramming and drawing. It is ideally used for making the intricate cores and molds required in aircraft and other precision industries. Use of two roll-over cylinders and oil dash pot control assures smooth uniform operation. "J & J" has just the machine you need.

Write or phone about immediate deliveries on these and other types of J & J machines.

THE J & J JOHNSTON JENNINGS CO.

867 Addison Road • Cleveland 14, Ohio

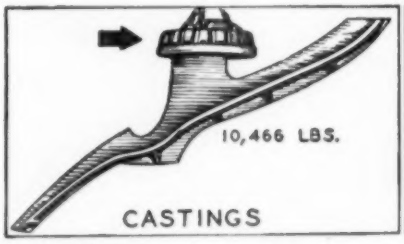
IMPROVED UP-TO-THE-MINUTE MOLDING MACHINES FOR EVERY NEED

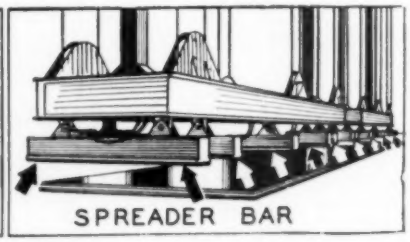
(*Concluded from page 224*)

tions. Dust from the grinders and the two airless blast units is removed by suction and disposed of by a dry collector. Grinding completed, the castings are passed to a 68-ft long inspection bench by means of seven chute conveyors serving the grinders at either side.

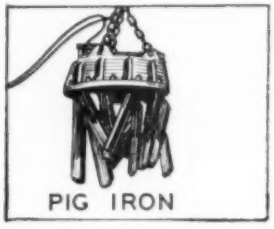
Following final inspection, the castings are loaded into tote boxes to be transferred to the company's machining and assembly department. In event broaching and straightening of castings is required, there are available in an adjacent area of the foundry two rope drop hammers, two fluid power presses and one hydraulic press. The three latter, of 25, 50 and 500 tons capacity, respectively, can be utilized for either broaching or straightening.

From raw materials to finished castings, the foundry is laid out for straight-line flow and complete elimination of back-tracking. Furthermore, every opportunity has been taken to mechanize operations primarily to speed up production but also to eliminate handling and health hazards to personnel. In every respect the South Bend installation stands out as an example of what engineering skill and ingenuity and modern equipment can do in the large, mass production foundry.





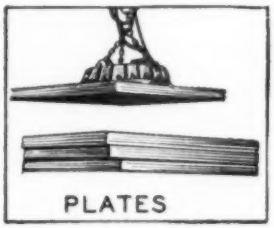
Lifting Magnets FOR ALL PURPOSES



You get definite saving of time and labor in moving material inside and outside of your plant with Stearns Lifting Magnets.

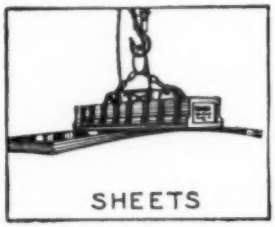
Will speed your loading and unloading operations—obviate hand labor on dangerous and difficult jobs—increase storage capacities—reduce your costs.

Let Stearns give you a lift with sturdy, dependable, low initial and operating cost magnets. Can be had in all practical sizes and shapes to suit your requirements.



Stearns Magnets are being successfully and profitably used in handling scrap iron, loose or baled; steel plates, coils, bundles, strips, rails, slabs, billets, pig iron, castings, borings, turnings, finished products, etc., as well as for road and floor sweeping purposes. Can be installed on industrial crane trucks for out of the way spots not reached by overhead cranes.

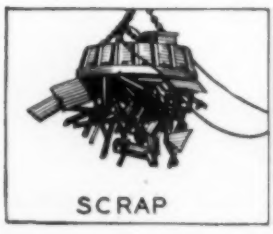
Stearns Magnets pay for themselves in a short time, require surprisingly little attention, are your best bet for economical, fast and safe moving of material.

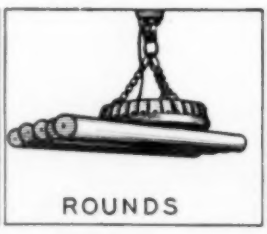


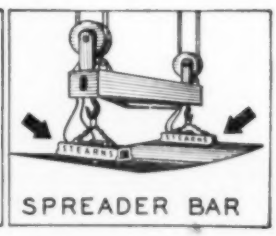
And—we can furnish Suspended Separation Magnets also in sizes and shapes to do your work.

Stearns Magnetic Mfg. Co.

662 So. 28 St. Milwaukee 4, Wis.







Where Are The Toy Banks of Yesteryear?

(*Continued from page 85*)

he was on the job, perhaps the eminent scientist could explain why foundrymen persistently refuse to blow their own horn regarding the excellence of their product. Also why they stubbornly insist on practically giving away their product, while the manufacturers of other and competing products demand and receive prices that represent a fair exchange for the knowledge and skill, and in many instances the blood, sweat and tears incorporated in the product.

Could Buy a Bank for $1

Coming back to the good old days a customer could go into a toy shop or general store and buy a Circus bank, Dentist, Horse Race, Merry-go-round, Harlequin, Initiation First Degree, Shoot the Chute, or any one of forty other good banks, done up tastefully in a neat wood carton with name thereon, for a price ranging from $1.25 to $2. Old catalogs issued from 1880 to 1910 list practically all of the old mechanical banks, to wholesale to shop keepers at $8 and $9 per dozen. The shop keeper retailed William Tell, Eagle, 'Spise a Mule, Speaking Dog, Creedmore, Clown on Globe and many others in the same general classification at $1 each. The Tammany bank, Owl, Darkey in Cabin Door, Pig in High Chair, Dog on Turntable and many others sold for 50 to 75 cents each.

Simple still banks made to the approximate image and likeness of wild and domestic birds and animals could be had for the modest price of 5 and 10 cents each. Larger banks representing animals and buildings commanded higher prices, from 25 to 50 cents each. Elaborate specimens in the form of safes with combination locks sold for as high as $1 each. Price of Girl Jumping Rope was $2.50 and the Bulldog Savings Bank—try to rob that one—could be had for the staggering sum of $3.50. Available records seem to indicate that the highest priced still bank was the Freedman's Bank manufactured by Jerome Secore in Bridgeport, Conn., about 1880 and listed in a jobber's catalog issued by

(*Continued on page 228*)

ANOTHER REASON *Why* **MILWAUKEE**

JOLT SQUEEZERS

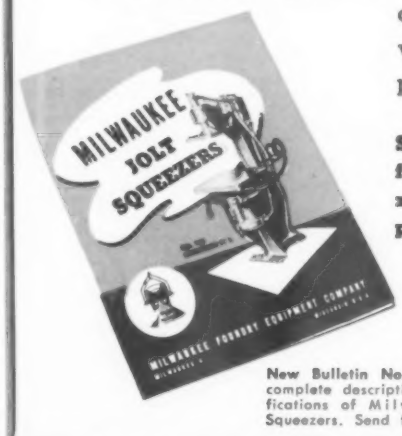
GIVE YOU *Better Molds . . . and More of 'em!*

ORIGINAL PARALLELISM BETWEEN PLATEN and TABLE *Always Maintained!*

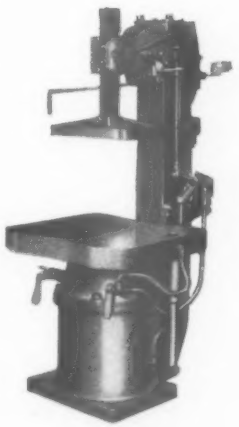
No. 103
Stationary Jolt Squeezer with 10" squeezing piston. Accessible from 3 sides.

Milwaukee Jolt Squeezers give you the accuracy you need at all times to get better molds . . . and more of 'em! Platen and table are kept in alignment because they are designed to maintain original parallelism regardless of hinge pin wear. This construction makes ram-offs impossible! Milwaukee Jolt Squeezers are ruggedly built and easy to operate. Intensity of jolt for light or heavy molds is easily controlled by simply turning a choke screw in the side of the jolt valve. When working in a wide range of pressures, squeeze accuracy is maintained by operating a conveniently located squeeze valve handle. Upkeep is low because renewable surfaces are provided at wearing points to simplify and reduce maintenance.

Satisfy yourself of the superior performance of Milwaukee Jolt Squeezers . . . compare them point for point with other similar machines.



New Bulletin No. 118. Gives complete description and specifications of Milwaukee Jolt Squeezers. Send for your copy.



No. 142JS
Stationary Jolt Squeezer with 14" squeezing piston. Not available in portable type.

No. 124
Portable Jolt Squeezer with 12" squeezing piston, steel wheels and mold shelf.

MILWAUKEE *Foundry Equipment Co.*

3238 W. PIERCE STREET, MILWAUKEE 4, WISCONSIN, U.S.A.

(*Continued from page* 226)

Oscar Strasburger, New York, to sell at $66 per dozen. Naturally the greater number of still and mechanical banks reposing on collector's shelves today represent the varieties made in immense quantity. The rare and extremely rare and therefore more highly valued specimens are survivors from the designs that for more than one reason or another never went into large production.

Banks of the 1880's are typified by six examples from the pages of a jobber's catalog. Animal figures began to come more and more into prominence. The subject of choice was not quite as good as in the preceding decade. In their desire to put out something new, the bank makers were beginning to take second best ideas coupled with more complicated mechanical action. Consider instructions for operating the Bulldog bank: "'Place money on his nose, pull tail down and then release, causing three distinct movements—head pulled backward, jaws open and money drops in. After this swallowing of food placed on his nose, release of the tail pulls the head back to original position ready for another feeding."

In Paddy and His Pig, the penny is placed on the pig's nose and a lever is pulled. Thereupon Paddy's eyes roll back, his mouth opens and his tongue licks the penny from the pig's nose. And what do you think of that Horatio? All for a penny! In the Cabin bank, movement of the whitewash brush causes the negro to stand on his head and kick the coin into the cabin. A very neat bit of drop kicking indeed. The Mirror Multiplying bank has no special mechanical action, but, according to the naive description, depends for its appeal upon the optical effect. Then as now, any excuse is good enough to look in a glass. When a penny is given to the teller of a Novelty bank and a lever is pulled the door is closed and the donor may observe through a window the passage of the teller to the place of deposit. The depositor also has the opportunity of bidding his penny goodbye. The Frog on Stump performs a simple swallowing movement. Simple but complete so far as the penny is concerned.

Overlooked One Feature

Typical banks of the 1890's include the Boy on Trapeze, William Tell, 'Spise the Mule and the Speaking Dog. In the William Tell bank the penny serves for a shot for knocking the apple from the boy's head. While this bank appeared in the '90's, a similar type of shooting bank (Creedmore) had been introduced in an earlier decade. In the Speaking Dog and Mule banks the action for depositing the coin is still fairly direct and simple and undoubtedly would delight a child. All the early makers seem to have overlooked the feature that appeals to all children. Something that makes a loud BANG, rings a bell or blows a whistle. In the Chinese Beggar, a contemporary paper mache bank, the head nods when a penny is inserted. This typifies the German attempt to compete for the American toy market. That it did not succeed is shown by the fact that this foreign bank is a rarity in America.

After 1900 the banks primarily became mechanical toys in which the saving element was very minor. A glance at the pages of manufacturer's 1906 catalog indicates the over-elaboration which characterized the period. Many of the late mechanical banks were nickel plated. They lacked the naive charm of the earlier cast iron banks with their brightly hand painted exteriors. The Jumping Rope Bank is the ultimate of something or other. In a description of this bank the maker says: "In manufacturing this bank the aim has been to produce a prolonged and continuous performance of its amusing features without the aid of expensive mechanism. This has been ac-

(*Continued on page* 230)

They RESIST WARPAGE

. . . it's less than 0.1%

Transite Core Plates offer all these advantages:

They speed production

Core makers save trips... handle many plates at one time.

They last longer

Made of fibrous asbestos and cement, Transite Core Plates resist shock...are less likely to crack or break.

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Core wash, sand, etc., do not stick as readily as to other materials. Both sides are usable.

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Transite Core Plate surfaces stay smooth even after long service. Warpage is less than 0.1%.

They are economical

Low price, low maintenance and long life add up to low cost.

To eliminate green cores and reduce baking time perforated plates are also available.

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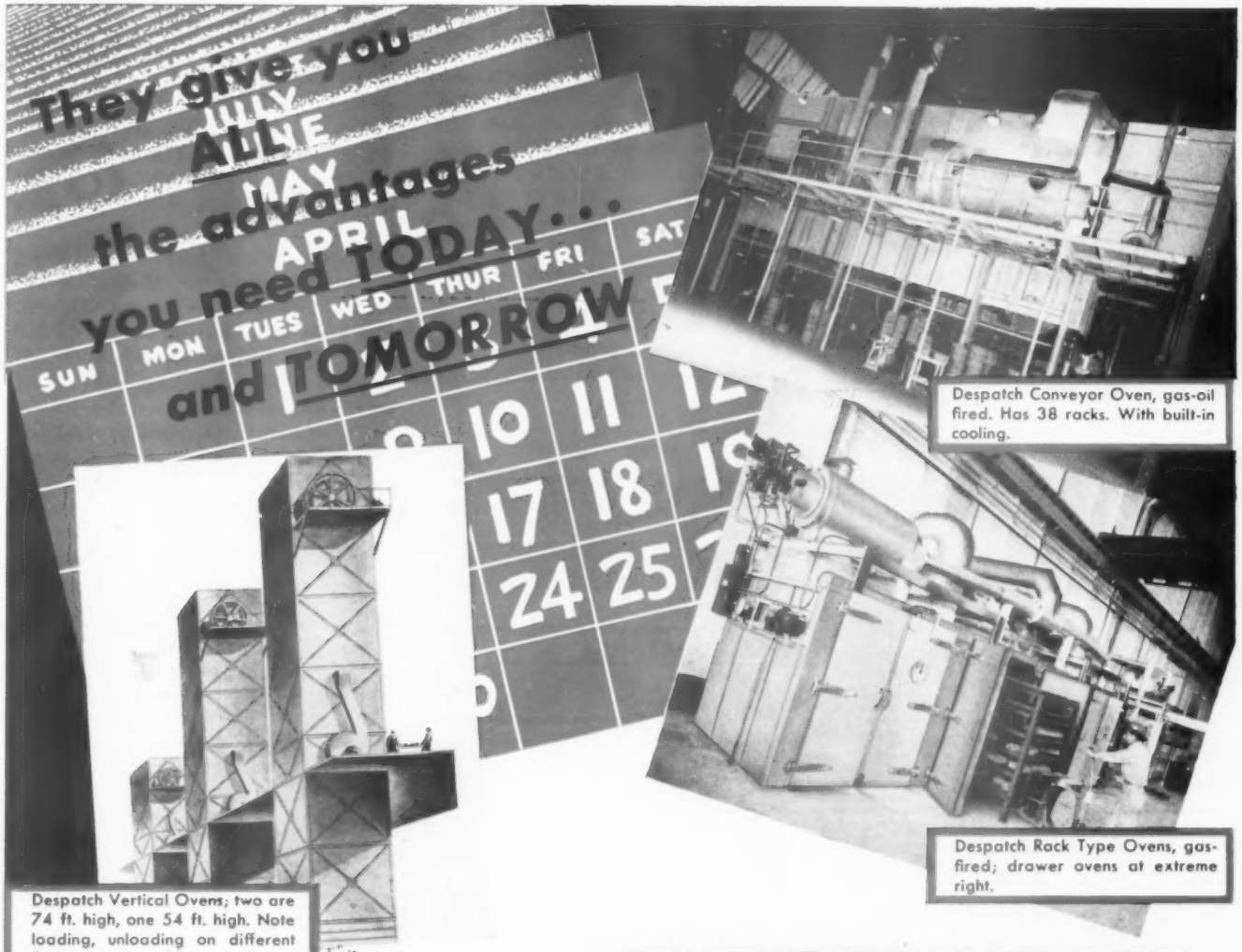
MADE OF ASBESTOS



Despatch Conveyor Oven, gas-oil fired. Has 38 racks. With built-in cooling.

Despatch Rack Type Ovens, gas-fired; drawer ovens at extreme right.

Despatch Vertical Ovens; two are 74 ft. high, one 54 ft. high. Note loading, unloading on different floors.

Despatch Car-Loaded Oven, gas-fired. Bakes 10 tons per charge.

Despatch Drawer Oven for baking large and small cores at same time.

DESPATCH
CORE BAKING OVENS

For an oven that will stay modern year after year, you can't do better than choose DESPATCH. This is because every oven, batch or conveyorized, is *individually* engineered for the job it's got to do . . . with extra built-in capacity and flexibility to handle still tougher jobs tomorrow. In other words, your DESPATCH Oven "stays in style" . . . keeps on giving you *better*, faster, more economical performance.

Despatch Conveyor Ovens: Efficient labor-saving ovens that help cut core costs . . . give maximum output (over 10,000 lbs. per hour) from floor-space. Vertical, horizontal, elevated types; gas or oil.

Despatch Batch Ovens: Easy-loading high output ovens for all-purpose baking . . . can handle any job in your foundry. Available with double-end doors for extra-fast, straight line handling. Car, rack, truck and shelf models; gas, electric or oil.

Despatch Drawer Ovens: New, compact, fast-baking units for production or special jobs . . . bake thick and thin cores at same time! Very easy to load. In 48 popular models; gas, oil, electric.

WRITE TODAY for bulletins, photos, baking data.

DESPATCH OVEN CO. 201 DESPATCH BLDG., 8th ST. AT 7th AVE. S. E. MINNEAPOLIS 14, MINNESOTA

DESPATCH
OVEN COMPANY

(*Continued from page 228*)

complished by invent.ng a simple, strong durable spring motor. The simulation of a skipping rope is perfect. The body, head, feet and rope all moving in unison, but each part performs independently in its own peculiar and appropriate manner." Sounds like a modern sales talk hot off the griddle. In spite of all the shouting and tumult, one has to look for some time before finding the coin slot. In fact this toy could be enjoyed without any vulgar mercenary penny pinching feature. These late banks were not made in any quantity. In some instances it is fairly certain they never passed the sample stage.

It is rather difficult to assign causes for the disappearance of the mechanical bank. One cause may have been the greater popularity of combination safe banks which originated in the late 90's. Another possible cause lies in the fact that the schools developed special savings plans for the convenience of the boys and girls who happened to arrive with some small change burning holes in their pockets. Banks and trust companies got out their own little satchel like safes which could be opened only at the teller's window. These met a mixed reception. They were welcomed by the savers and cordially detested by the spenders.

Undoubtedly all these contributed to the decay of a toy and an industry destined from the beginning to be ephemeral or to use a more homely expression, more or less a flash in the pan. Perhaps that expression needs further explanation. Quite a spell since the old flintlock was used. Look it up in the encyclopedia. Practically every hickey, dingus, doodad and gadget was exhausted before mechanical banks disappeared. Looking over a collection of the remaining types one is amazed at the ingenuity displayed in designing so many ways of jiggling the penny before it was swallowed or made to disappear in any other manner.

Worth More Dead Than Alive

Although only approximately 70 years old, mechanical banks already have become a recognized and valuable collector's item. Banks that sold originally for $1 or $2 in all the glory of red, green and yellow paint, may command up to $100. Curiously enough it is the newest, and not the oldest mechanical banks which sometimes bring these fantastic prices. As with all commodities, scarcity is the principal factor in setting the price. Many of the early banks were highly popular and were sold in large numbers. Made of good old solid and reliable cast iron they withstood all manner of abuse from their dear little owners and are still in the ring, while other and more fragile types of toys have disappeared utterly. As a result of this generous supply or residue, no great value is attached to the common class typified by the Tammany, Cannon and Eagle banks. Hall's Excelsior, the oldest of them all, can still be had for about $2. Sales are few and noticeably lacking in excitement. In contrast, banks of the 1880-1890 period bring distinctly better prices, in some instances up to $35. The rarest of all banks is a single specimen, probably a sample of a design that never reached the production stage—casualty that reduced the inventor's already low faith in the taste and perception of the human race.

To understand a situation in which a toy bank, merely a bit of flotsam or jetsam to the ordinary person, can bring a fabulous price, one has to have some knowledge of, or familiarity with, bank collectors. They are relatively few in number, but what they lack in numbers they make up in enthusiasm and acquisitiveness. Their principal object in life is to capture, beg, borrow, steal or in extreme cases—buy objects for which no other collector posseses a duplicate. They are constantly on the

Investigation of Aluminum Bronze Alloys is warranted by foundrymen and designers where metal parts are subjected to either recurrent stresses or compressive forces and resistance to fatigue is sought; where the ability to withstand high temperatures or, where a high degree of corrosion resistance to many chemicals may be a significant factor in material selection. Supplied by Ajax in alloyed compositions of copper, aluminum and iron, as well as special alloys containing nickel and manganese, a complete selection of Aluminum Bronzes is available to meet all existing specifications as listed by Non-Ferrous Ingot Metals Institute, ASTM and the Federal Government.

Ajax, in adhering to its policy pioneered in the very infancy of the non-ferrous metal industry, exercises the closest scientific control over the production of these alloys. Metal men may look to Ajax with continued confidence not only for supply of highest quality Aluminum Alloy ingots, but also for practical technical know-how on correct foundry practice for producing better castings with fewer rejects. Request booklet "Ingot Metals of Today".

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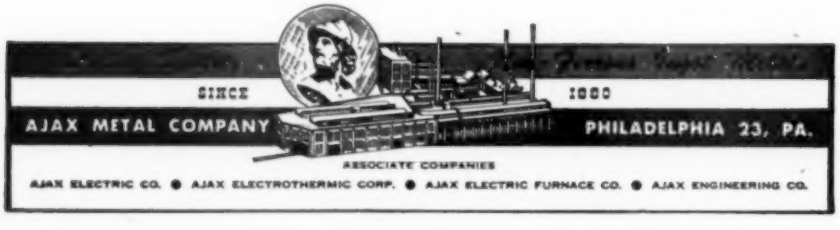
SINCE
1888
AJAX METAL COMPANY
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ASSOCIATE COMPANIES
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alert and in the race. Many of the most enthusiastic collectors are executive officers of banks and large corporations.

Next to his tool box, relic of his young days as a journeyman machinist, the late Walter P. Chrysler valued his elaborate collection of cast iron toy banks. In addition to the pride of possession, he was intrigued by the mechanical movements. Readers of his delightful biography which appeared in the *Saturday Evening Post* several years ago, will remember the chapter in which he paid tribute to an old boomer machinist in a Kansas roundhouse who showed him how to set the valves in a locomotive.

Where a dealer finds a rare bank it is not uncommon to offer it to several prominent collectors for competetive bidding. These men are not concerned with whether or not the bank was popular with children. They are interested only in whether it is unique, a rare item, and in the mechanical action.

Banks Are In Good Condition

In a general way it may be said that rare banks are newer, in better condition and more elaborate than the older and common varieties. The Harlequin is a good example of a rare bank. Although only a little over thirty years old, its clever design, interesting action and scarcity make it the joy and despair of bank collectors. The bank first appears on the flyleaf of a 1906 catalog, although a similar action was patented in 1887. The Merry-go-round is of slightly earlier vintage, and is considered a very good bank. Bank action is shown at its best and most complex in professor Pug Frog's Great Bicycle Feat. Release of a spring causes the frog to make two complete somersaults before depositing the coin in a basket held by the clown. Related actions are the spring of the wheel and the throwing of music rack in the face of Mother Goose and causing her tongue to wag. A very clever combination and well worth a penny or several pennies of any person's money, child or adult.

About 75 per cent of the surviving production of mechanical banks in this country is in the hands of 10 or 12 outstanding collectors. All the collections are appraised at high value. Addition of new collectors searching for rare items continually drives the value upward. In the popular language of the day, who would have thought that a partly worn and ancient plaything like a mechanical bank would attain importance enough to be placed in the cabinet of a connoisseur. The mechanical bank is the first toy outside the doll to have reached this popular pinnacle. Dolls have been made in every conceivable shape and material with the possible exception of cast iron. Subject to correction by some lynx eyed reader, it is fairly safe to say no person ever saw a cast iron doll.

Perhaps it is because of its true American flavor that the cast iron bank has had and still has so many enthusiastic friends among collectors. In an idle hour it might be interesting to estimate or speculate on what might happen if and when the fad of collecting other toy types becomes widespread or general.

Few people will deny that children have a natural acquisitive tendency. The quantities of old stones and sticks brought into the play room supply mute evidence. The bank's success in translating this tendency to the gathering of money is somewhat questionable, at least for the more elaborate banks. Children with no particular desire to save may have thrilled over the mechanical bank, but any container will serve if the child really is in earnest in the desire to collect a bank full of pennies or other coins. Most of the banks referred to in preceding paragraphs really were mechanical toys incidentally devised to encourage thrift in the recipients. Today there is little thrift talk with children and little use for banks. However, the mechanical bank always will remain to

AJAX
TAMA-WYATT
ELECTRIC FURNACES
for the ALUMINUM ALLOY
FOUNDRY . . .

THE AJAX-Tama-Wyatt Low Frequency Induction Furnaces are now made in small sizes with capacities ranging from 20 to 35 kw.

Their operation is based on the induction principle whereby energy is transmitted to the molten charge without actual contact, through the refractory walls. Only the metal is heated, and therefore, there are no resistors or other parts having a higher temperature than is absolutely necessary for properly melting the charge. A gentle movement of the bath insures uniform temperature and homogeneous mixing of the alloy ingredients. Linings are made of inert refractories which do not contaminate the melt.

These melting machines are delivered with a self-contained completely factory wired control cubicle, including automatic temperature controller.

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INDUCTION MELTING FURNACE

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NOT this—

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"Pulsating Magnet"

ELECTRIC VIBRATORS

makes stubborn materials flow freely thru

bins, hoppers and chutes

Send us a description of your problem —thickness of hopper walls, etc.—we'll be glad to submit a recommendation, or—

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Oh My!

Carries its weight

in your Foundry where there's work to do. Save those castings with Shelton surface patching cement—sets like the Rock of Gibraltar.

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AMERICAN CRUCIBLE COMPANY

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delight the collector. It represents 19th century art at the zenith. It is easy to believe that originally many adults bought them to play with. This would not be the first time that adult taste has determined a toy's ephemeral popularity.

CUPOLA REFRACTORIES

(*Continued from page* 95)

of ganister and fire clay. These mixtures vary from 3 to 1 (ganister:fire clay) on down to predominantly fire clay composition. Perhaps the best practice, if there is a best practice, will employ a ratio approaching 2 to 1 of silica to clay. This will depend upon the nature of the clay and particularly its plasticity and its shrinkage characteristics. The latter may be compensated for by the addition of fire clay grog to these silica clay mixtures. The use of low grade clays, loams, and materials of low refractoriness should be avoided.

A very important consideration is the proper grain sizing and grain distribution in preparing these mixes. Every refractory manufacturer is well aware of the effect of grain sizing of silica or ganister in manufacturing refractory products. The use of the proper combination of coarse and fine grain size ganister will generally give best results.

Requires Proper Mixing

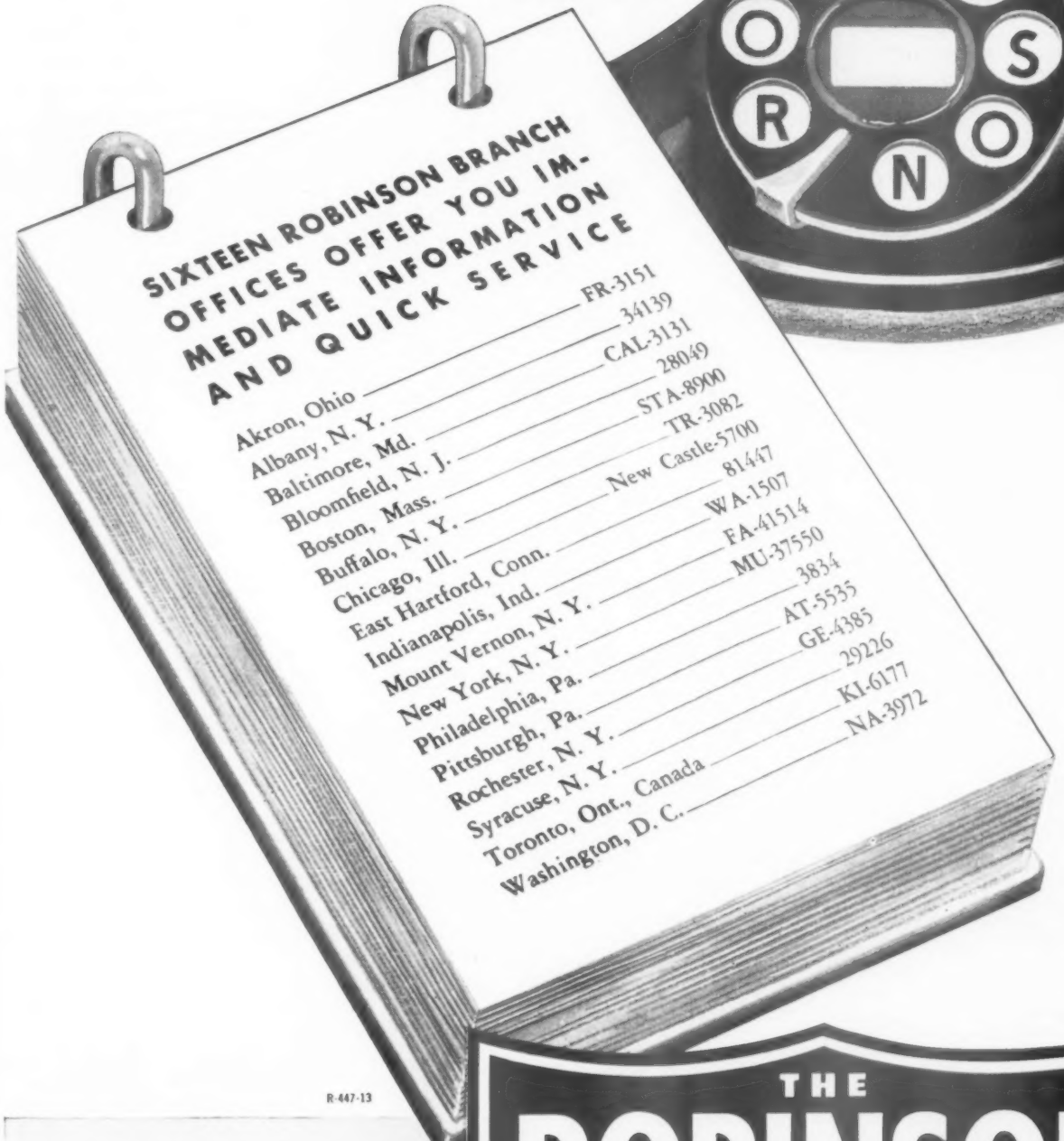
Perhaps of no less importance than composition and materials used is the method of tempering and preparation. It is an economy to provide for mulling or thorough mixing of the daubing mud. Without proper mixing the optimum properties of the material used cannot be obtained. Variable results will almost always follow.

The amount of water used will depend upon the nature of the raw materials and the manner in which the daubing mud is to be applied. It is desirable to mix the mud well in advance of the time it is to be used to allow for the development of the maximum plasticity and workability of the clays contained in the mix. As to the method of using, some operators use a fairly wet (thin or sticky) mud and apply by throwing in balls on the surface to be patched and pressing the fire clay shapes into place.

Others use a drier mix and hammer or force the refractory shapes into place. Some operators prepare a very stiff mix and tamp it into mortar boxes until it is required. It can then be sliced off in slices and hammered into place. We favor the use of the dry mixes (as dry and compatible with proper installation) since the dry mixtures are subject to

(*Continued on page* 234)

FOR QUICK SERVICE ON REFRACTORIES *call*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ROBINSON
CLAY PRODUCT CO.
AKRON 9, OHIO

PORBECK DRAWER TYPE OVENS

GAS OR OIL FIRED
WITH RECIRCULATING
AIR HEATERS

UNIFORM CORES CONTINUOUSLY WITH LOW COST OPERATION

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Manufacturers since 1894 of Core Ovens, Mold Dryers, Processing Ovens, Mold Drying Ovens, Heat Treating Ovens, and Paint Baking Ovens.

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ELIMINATE SWAB,
Brush and Spray Can and
IMPROVE Production
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BLACKEN MOLDS

with the
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Blackening reaches hidden pockets as well as all accessible surfaces and is driven into the pores of the sand by air pressure. Molds are blackened faster! Castings peel better! Work comes cleaner!

SATISFACTORY PERFORMANCE GUARANTEED OR MONEY REFUNDED

Trigger control means effortless handling and economy of air consumption. Used for Silica wash, oil, water or any liquid material. Used for sand blast cleaning of permanent molds and castings. Without suction hose the Murphy Pistol Sprayer becomes a perfect blow gun, used to advantage for the cleaning of motors and machinery.

Prices, complete with Suction Hose and Sinker

Pipe Size	Price FOB Hamilton, O.
1/16"	$10.00
1/8"	10.00
1/4"	10.00
3/8"	12.00
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(*Continued from page* 232)

less drying and burning shrinkage.

The general method of making the repair with natural stone necessitates the same general procedures as in repairs with fire clay shapes. However, care must be exercised in providing for adequate expansion of the stone used and proper stone selection and placement with reference to graining of the stone.

Repairs with monolithic mixes are sometimes made by replacing the entire burned out section with silicious ramming or daubing mixes or plastic refractories. In this practice it is desirable, if not essential, to provide for as much anchorage as possible and to use extreme care in ramming the mix in place.

Boshing the Melting Zone—In our discussion we have mentioned the use of boshed sections. Actually these are not a true bosh since the effective diameter has just been reduced somewhat in a section of or through the entire melting zone. A true boshed section is being used by some operators and its use has several merits. It would appear to be a more natural melting zone contour, as attested by the fact that the melting zone burns out to a boshed contour.

Favors Boshed Shape

The use of proper furnace contour to facilitate proper handling of materials and proper combustion is well recognized in other metallurgical furnaces—particularly reverberatory type furnaces. The same analogy should hold for the melting zone of a cupola and better combustion should result. Another advantage is that the boshed section, being the natural contour, should burn out less and the total cupola volume should be easier to maintain. This constant volume would permit more accurate control and regulation of the coke bed height, which changes when a melting zone burns back and the same volume of coke has to cover more area.

Operators obtain this bosh contour by making the initial installation along conventional lines previously described and then preserving the burned-out contour obtained by patching along this contour instead of back to the original contour. Why wouldn't it be more desirable to make the initial installation to the desirable contour, using the proper refractory shapes to form this contour, and in so doing provide for additional stability of the lining? This is illustrated in Fig. 4, which indicates several types of melting zone linings. A is a typical double lining. B and C are typical double extended linings. In any of these linings the erosion or cut-out after the first heat is likely to be such that not enough of the service lining is left to permit contour patching with safety, due to the

(*Continued on page* 236)

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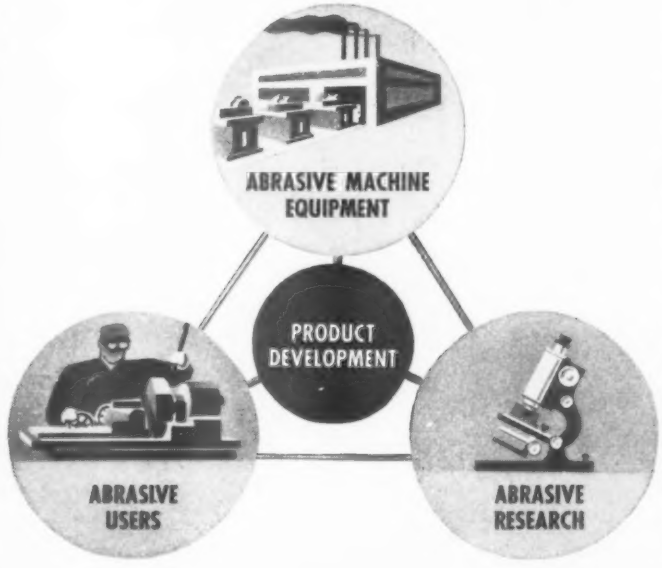

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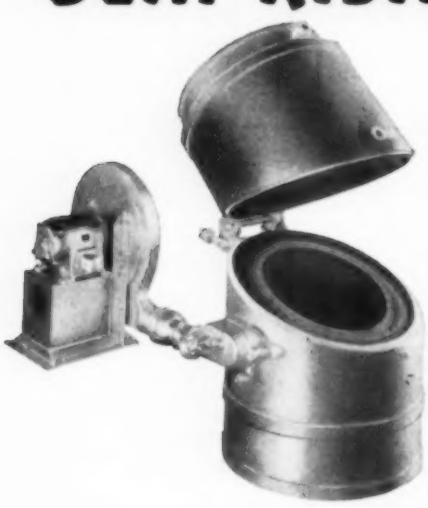

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(*Continued from page* 234)

thin lining on which the contour patching is done.

In this discussion we are suggesting the possibility of constructing a lining that approaches a bosh, as originally installed, and will become a true bosh contour after the first heat. Such an original lining might be installed as indicated in D and E of Fig. 4. These are only indications or possibilities, and other combinations utilizing standard shapes could be employed.

Such linings would be more stable after the burn-out of the first heat, and would permit continued contour patching with less frequent removal of the cupola blocks themselves. As such, more economical and satisfactory service should be obtained. Such a lining could be constructed from standard refractory shapes and the combination to suit varying service conditions could be determined. In other words, if contour patching has shown economies and better operation, why not go one step further and *contour line* on the initial installation and follow up with *contour patching* on the regular maintenance schedule?

Crucible or Hearth — Conditions of service in this section of the cupola are less severe than in the melting zone. The refractories are subjected to lower temperatures. The lining is subjected to the action of the molten metal and slag. Slag and metal penetration are the most important causes of failures. The usual practice is to use fire clay cupola blocks in this section. Good masonry is as important as the quality of refractory used. The use of high temperature refractory bonding mortars in this section will, we believe, demonstrate the advantages of their use in that the joints are made more resistant to slag attack.

Some operators are lining this section with a 4½ or 2½-in. course of 9-in. brick laid in with daubing mud with the thought that more frequent replacement is an economy over the use of a service lining of cupola blocks. Some even use super duty refractories for this purpose. We wonder if this practice couldn't be improved upon by lining the crucible with a service lining of standard 9-in. circle brick inside the backing lining and taking the advantages of better masonry for longer life. The practice of protecting this section of the cupola with a layer of sand (installed at the same time and forming an integral part of the sand bed) is sometimes resorted to. This expendable protection has been found to be a refractory economy in some shops.

Charging Zone—This zone is not subjected to high temperatures or slag attack. Abrasion from the descending

(*Continued on page* 238)

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(*Continued from page* 236)

charge is perhaps the primary course of failure in most installations and this varies considerably with the type of charge and the type of charging equipment. In some cases thermal spalling is the primary cause of failure and in other installations runs a close second to mechanical abrasion as the destructive influence in this zone.

We would probably be safe, therefore, in attributing failures in this zone to the following two causes, with the extent to which each contributes being apparent in different installations: 1. Mechanical abrasion. 2. Thermal shock.

The refractories used in this zone are usually high heat duty stiff mud liners. Some manufacturers furnish power pressed or dry press blocks of sufficient hardness and better spalling resistance for this service. Ordinary dry press liners suffice in many instances. In some severe cases super duty refractories have been employed to resist the excessive thermal spalling, but this practice is seldom resorted to.

Stack or Zone Above Charging Door—Refractory service conditions in this section are not severe and little consideration is given to its refractory requirements. The function of refractories in this zone is primarily to protect the shell from the effluent stack gases.

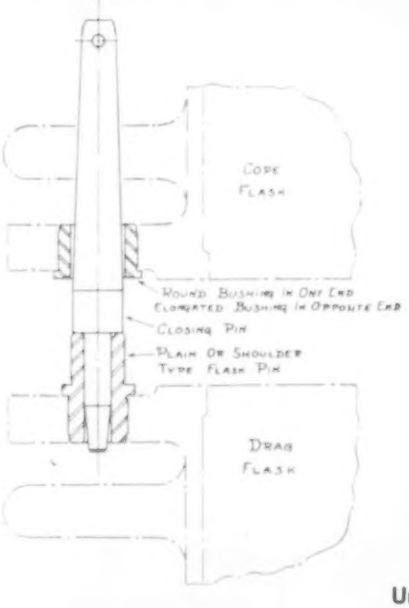
On standard No. 4 cupolas (56-in. shell diameter) and the smaller sizes a 2½-in. lining is used. Such linings are formed using standard 9-in. straights layed on end in dead man courses. This doesn't seem like adequate refractory protection, but it is the easiest and most economical way to form the lining using standard series. Since severe mechanical stresses are usually not encountered in cupolas of No. 4 size and smaller, this type of construction can probably be considered adequate.

For No. 5 cupolas and larger, this section is lined with a 4½-in. lining. The conventional method consists of using the proper combination of 9-in. straights and 9-in. No. 1 arches layed in soldier courses. This type of construction has given fairly good service, but the writer has noted many cases of loosening and breaking off of the brick. This type of mechanical failure is particularly prevalent in the section adjacent to the wishbone charger in the larger installations.

A much more stable construction could be obtained if this zone were built with 9-in. circle brick. Such construction would much better resist the shock impact of charge and eliminate the loosening and breaking of the refractory lining laid up with the conventional straight and arch construction. It is true that the service from the conven-

(*Concluded on page* 240)

UNIVERSAL PRESS FIT FLASK PINS AND BUSHINGS



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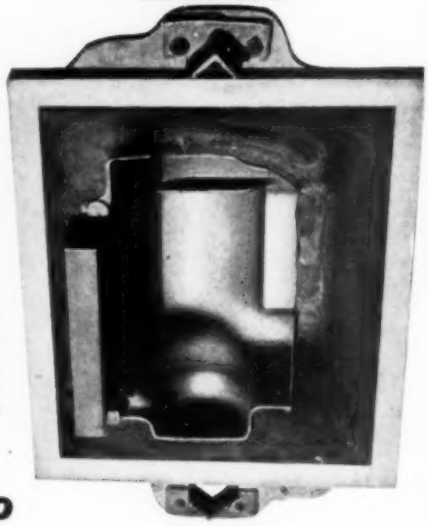

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(*Concluded from page 238*)

tional construction often goes for years without replacement, but the circle brick construction would result in even greater life.

Tapping Blocks—The tapping section or breast is of paramount importance. Failure here is critical. General practice involves either (1) a refractory breast brick or tapping block or a monolithic or formed tap. If the former is used it is economy to choose a standard design. Such blocks can be furnished in any quality refractory. High heat duty blocks are usually adequate. Super duty and special burned super duty are used on occasion with good results. Mullite and special super duty refractories find some application in tap-out service.

If a monolithic tap is preferred the use of a plastic refractory, either high heat duty or super duty plastic fire clay refractories, or specially prepared ladle plastic, will usually be more satisfactory. If ganister mix is used, all the precautions of controlling the proportioning, sizing and mixing previously described should be adhered to.

With any monolithic tap the method of installation is important. Some operators insert a mandrel or form the size of the tap hole required and ram the lining around it, withdrawing the mandrel after the ramming is complete. Another very satisfactory method is to ram the breast solid and form the hole by driving a bar through it starting with a small diameter bar and using increasingly larger bars until the bar of the size hole required is used.

Some operators employing front slagging practice are using tap-outs in which the tap is formed of a carbon block or strip and report less cutting from the slag.

Slagging Blocks—Both prefired shapes and monolithic construction are used for this application. High heat duty and super duty are used. Silicon carbide is often employed, but care must be taken to control the iron, for if it raises up and contacts the silicon carbide, it attacks it rapidly. This, however, should not be too much of a problem if careful operation is adhered to.

References

2. Blackburn, A. R., "Massive Quartizite," Ohio State Engineering Experiment Station *Bulletin* #124, November, 1945.
3. Cress, Wm. C., "Converter Refractories," AFA *Transactions*, Vol. 52, page 854, 1944.

Testing Bearings

American Society for Testing Materials, 1916 Race Street, Philadelphia 3, has issued a 65-page booklet entitled "Symposium on Testing Bearings" which contains five papers and discussion presented at the 1946 annual meeting of the society. Price of the booklet is $1.50.

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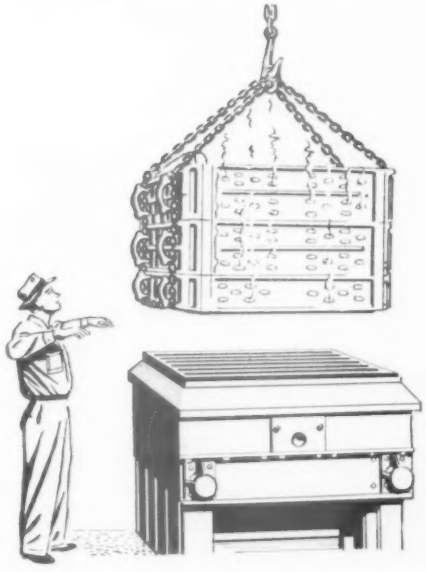

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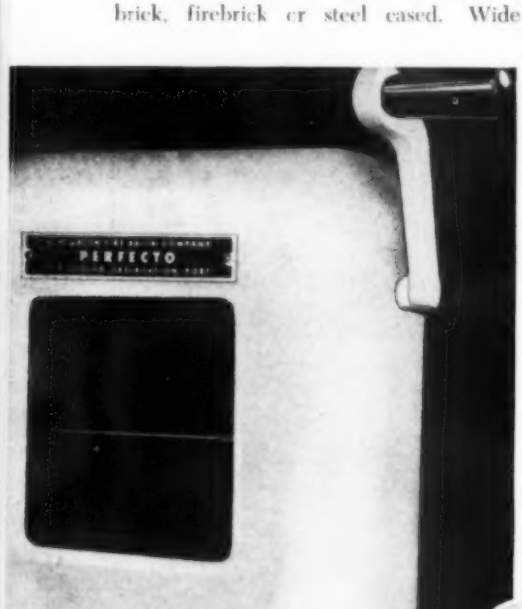
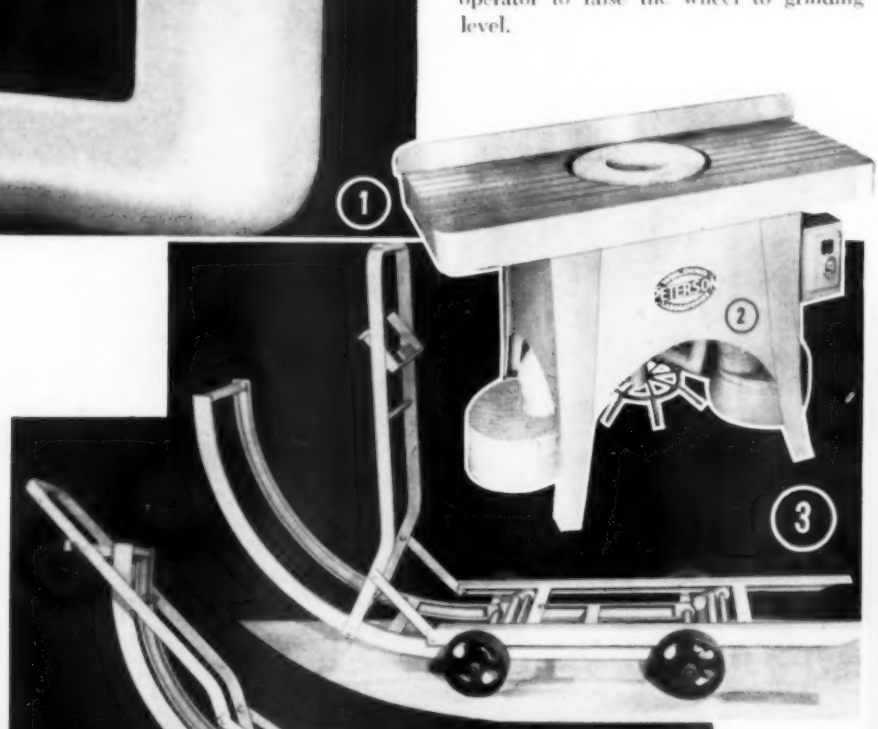


(2)—Grinder: Peterson Welding Laboratories, 1423 Virginia St., Kansas City, Mo.—Flat surface castings may be ground to within 0.001-in. quickly and with no set-up on this new grinder. Grinding wheel is level with the table top. A 16-in. suction fan bolted to the under side of the grinding wheel pulls grinding dust down and deposits it in two dust collectors. Grinder comes in two models—a 14-in. stone, 3-hp motor and 23 x 46-in. table top; the other has a 16-in. stone, 5 hp motor and 27 x 56-in. table top. Foot control permits the operator to raise the wheel to grinding level.

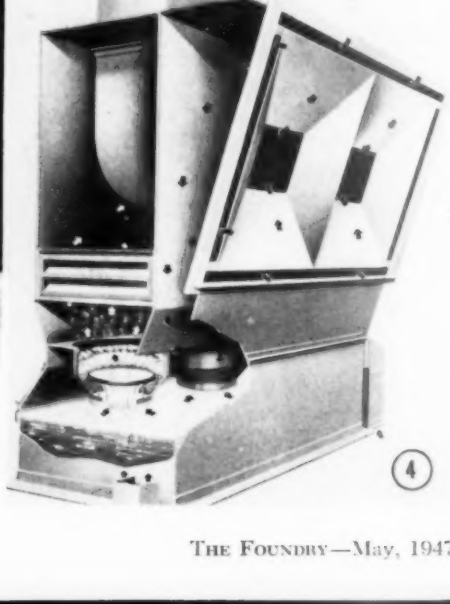


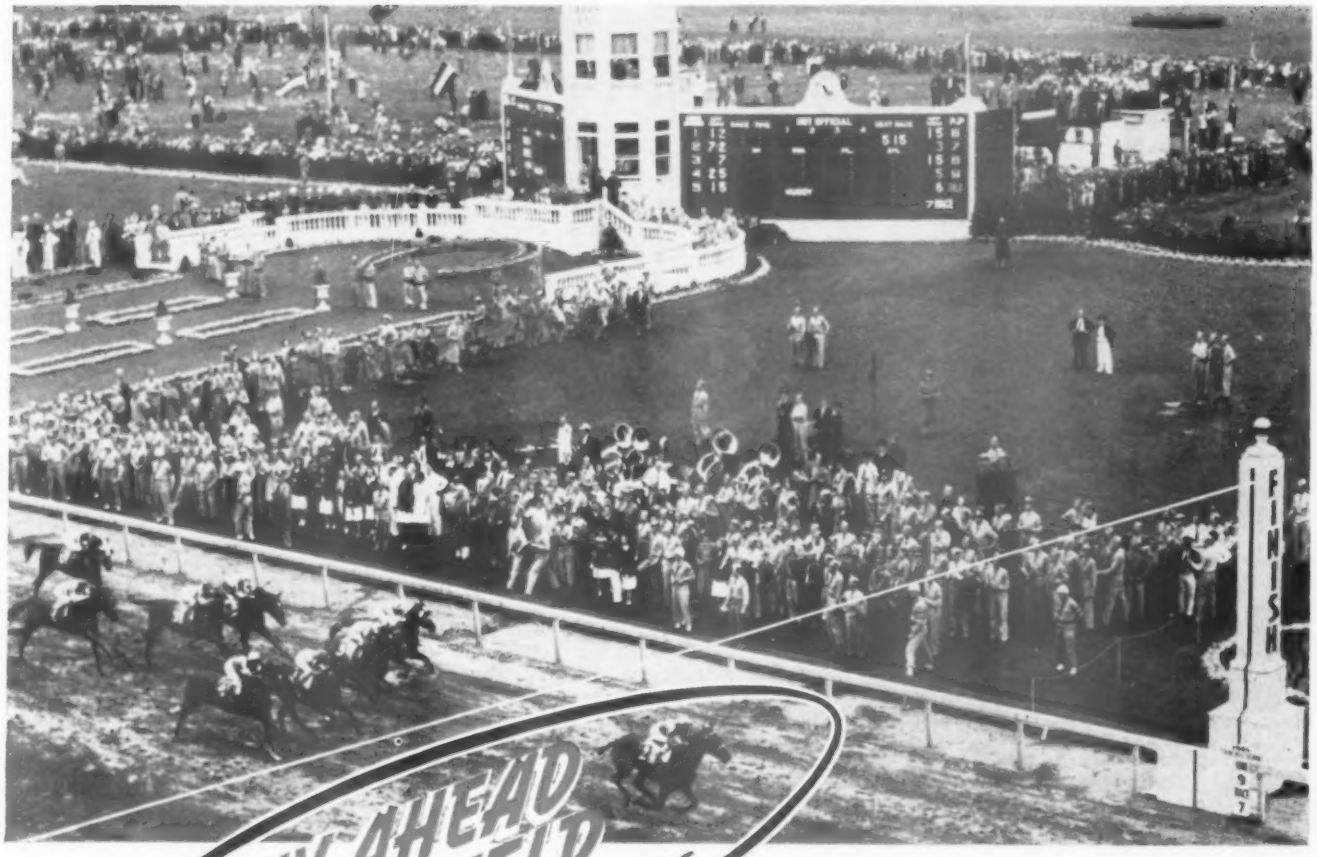
(3)—Hand Lift Truck: Arcade Mfg. Division, Rockwell Mfg. Co., Freeport, Ill.—Light truck is suitable for handling "short move" jobs involving loads up to a ton. It has found application in moving skid loads, boxes and trays of material, and other similar jobs. Overall length of the truck is 70 in., and the platform area is 11¾ x 43 in.

(4)—Shakeout Booth: Newcomb-Detroit Co., 5741 Russell St., Detroit 11—Self-contained shakeout booth complete with intake hood, air cleansing process and exhaust fan is available in five standard sizes which may be used individually or in combination to collect dust from shakeout, core knockout, shaker screening, sand transfer, mold conveyor and pouring operations. Units come completely assembled, ready to bolt to the floor. Connection of water and electrical services and the discharge ducts are the only installation operations necessary. Air is drawn into the booth and down a duct to the washing unit. Dirt from the air is collected in the form of wet sludge in the water tank in the bottom of the booth. An automatic conveyor carries the sludge to the discharge point. The air then passes through moisture separators, and from there it is distributed by a discharge fan. Water in the cleaning system is continuously recirculated by means of fan suction.

Gearshift Drive: Lima Electric Motor Co., 3101 Findlay Rd., Lima, O. — Separate motor-driven, selective speed gearshift drive can be used with any standard motor of ¼ to 1 hp rating. Gear ratios of the gearshift drive are 1 to 1, 1.33 to 1, 2 to 1 and 4 to 1. A unit cast gearbox provides permanent

(*Continued on page* 244)





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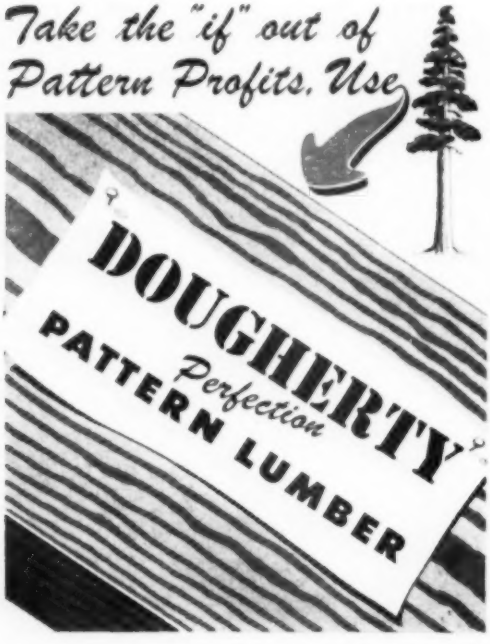

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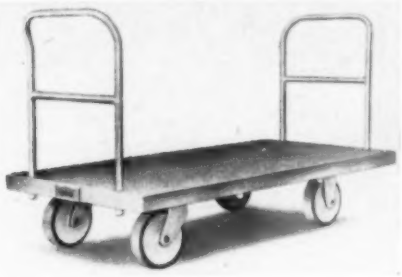
(*Continued from page 242*)

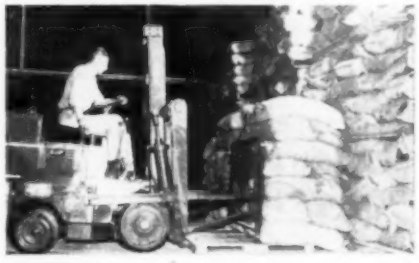
alignment, and highly efficient gears and bearings, adequately lubricated by a permanent oil bath, promotes long trouble-free service. The unit will operate in either direction of rotation.

Trailer: Mercury Mfg. Co., 4036 South Halsted St., Chicago 9—All aluminum trailer weighs 175 lb and has a nominal capacity rating of 2000 lb. Load platform is 14½ in. high, 3 ft wide and 6 ft long, but may be varied to meet special requirements. Trailer frame is of aluminum alloy structural shapes, and



deck is nonskid aluminum plate ⅛ in. thick. Deck and frame are of welded assembly. Wheels are 10 x 2½ in., equipped with solid rubber tires and roller bearings, and are mounted on aluminum brackets bolted to frame and platform assembly. Platform has aluminum alloy tube and stake pockets on both sides and ends.

Truck Unloader: Clark Tructractor Division, Clark Equipment Co., Battle Creek, Mich.—Pushing device on a standard fork truck unloads materials onto the floor. The pusher is practical for nearly any type of load. Retainers are used to hold the pallet in the job il-



lustrated, but other types of loads may be deposited with the pallet if desired. Pusher is also used with self-contained loads which do not require a pallet. Device has a maximum stroke of 52 in. and thrust capacity of 4000 lb.

Door Closer: Fleming Steel Co., 411 Neal St., New Castle, Pa.— Positive power closing of large and small swing type crane doors is accomplished by the use of powered closing arms. The device is said to eliminate the difficulty encountered with doors of this type

(*Continued on page 246*)

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- **big cut in man-hours**
- **no dust!**

You can confidently expect similar benefits in your foundry, no matter what you pour—iron, steel, non-ferrous.

It costs nothing to find out about Hydro-Blast's extraordinary money-saving advantages—and may cost a good deal not to. Write for an appointment with Hydro-Blast engineers.

HYDRO-BLAST

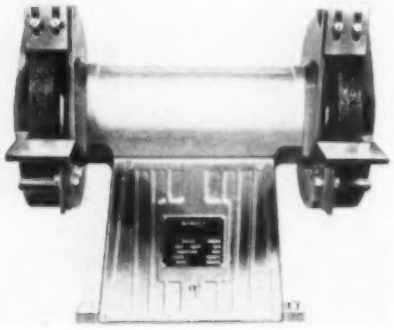
Chicago 47, Illinois

2550 NORTH WESTERN AVENUE

(*Continued from page 244*)

which are closed only by gravity. In opening, doors swing up to allow free travel of a crane between the plant and the yard and when closed provide a weathered closure which retains the heat in the building. Speed of the door is such that heat loss is minimized.

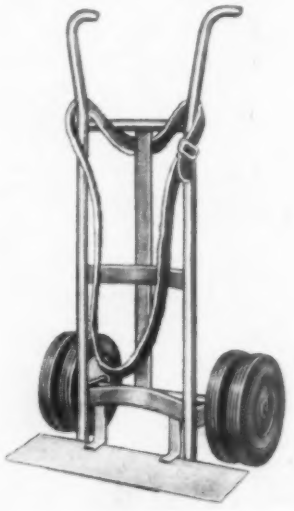
Grinder: Bardco Mfg. & Sales Co., 2450 East 23rd St., Los Angeles—Bench grinder features special small-diameter motor eliminating any projection in the working area between the two grinding wheels. Because the motor diameter approximately equals the grinding wheel retaining ring diameter, the entire grit portion of wheel can be utilized. Grinder base and motor housing are cast aluminum, speed is 3600 rpm and 7, 8 and 10 in. wheels are available. Standard equipment includes one coarse and one medium organic-bonded wheel, two enclosed wheel guards with adjustable tool rests, spark shields and built-in toggle switch.



Heat-Proof Paint: Markal Co., 607 North Western Ave., Chicago 12—Protection against corrosion and scale at temperatures as high as 1850 F is offered by this heat-proof paint. Hot metal can be subjected to sudden temperature changes, such as quenching, without cracking or peeling of the paint. The paint is applied while the metal is cold. It dries in about 20 minutes and can be subjected to red hot temperatures immediately after drying. The paint also provides protection to metals in all weather conditions.

Recording Pyrometer: Foxboro Co., Foxboro, Mass.—Electronic recording pyrometer has no galvanometer, no slide wire, no dry cell and requires no standardizing. Sensitivity is 1/10 of 1 per cent of the full scale range. The company's instruments are available with ranges between —200 and +2800 F, and for use with thermocouples or electric resistance bulbs. In addition to temperature applications, they are also used for the measurement or control of humidity, force, strain, pH, speed and other process variables.

Hand Truck: Handees Co., Dept. F., Bloomington, Ill.—Dual wheel hand truck has a detachable 7 x 14 in. nose piece. Wheels are solid rubber, 2 x 8 in., and have Oilite bearings. Construction is of strong but light tube steel. It is available with or without 13 ft x 2 in. strap and extra nose piece. Height, 54 in.; width, 24 in.; weight, 46 lb; capacity, 1000 lb.



Power Hand Truck: Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia 24—Fully powered hand truck uses electric motors to lift the load and propel the truck. Two models are available—one with a platform which can get under a 7 in. skid and hoist to 66½ in., the other with a platform which can get under a 11 in. skid and lift it to 70½ in. Both have a lifting capacity of 4000 lb. Trucks need only 54 in. aisles, will turn in a radius of 95 in. and climb a 9 per cent grade. Features include automatic braking, finger-tip controls, two forward and two reverse speeds and hydraulic release checks to cushion descents.

Furnace: K. H. Huppert Co., 6830 Cottage Grove Ave., Chicago 37—Medium size laboratory furnace auto-

(*Continued on page 248*)

when you want Speed—
when you want power—

. . . in your job of grinding, polishing, buffing, sanding, drilling, reaming, screw-driving or nut-setting, you want a Strand Flexible Shaft machine, because a Strand will do it faster, better, and stand up to it longer.

Strand Flexible Shaft machines provide constant speeds with greater operator convenience. Hundreds of attachments easily interchanged—125 types and sizes—models include vertical and horizontal type machines from ⅛ to 3 h.p. Distributors in all principal cities.

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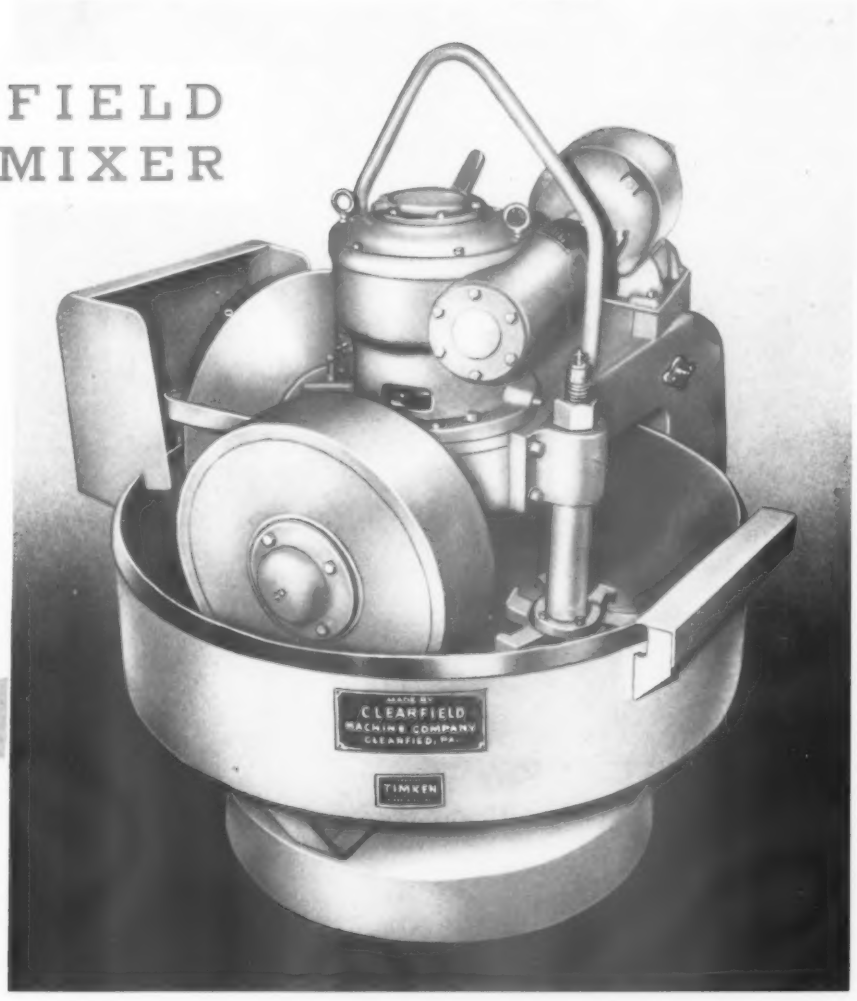
5010 NO. WOLCOTT AVE. CHICAGO 40, ILL.

PORTABLE, STURDY

LOW COST PRODUCTION

the CLEARFIELD
No. 414 MIXER



★ Designed for use with any make of motor in either open or closed frame, the No. 414 Clearfield Mixer is small, compact and light enough to carry to the work. It is built to stand up to continuous hard work with vibration almost completely eliminated and combines all the Clearfield features which guarantee fast, complete sand mulling.

Complete information on the No. 414 Mixer will be supplied on request.

CLEARFIELD MIXER
MIXES, TEMPERS AERATES

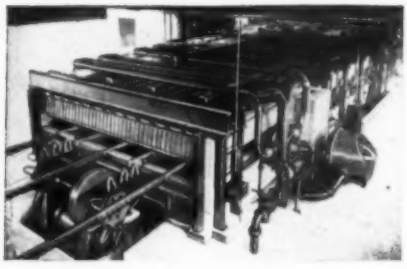
CLEARFIELD
MACHINE COMPANY
CLEARFIELD
PENNSYLVANIA, U. S. A.

R-S Furnace Facts

FOR THOSE CONCERNED WITH QUALITY HEATING OF METALS

New Furnace for Glamorgan Pipe & Foundry Company

A modern R-S continuous cast-iron pipe annealing furnace of the type shown is now under construction for Glamorgan at Lynchburg, the oldest cast iron pipe foundry in America. Pictured is discharge end showing control valves, Spencer Blower, and alloy fingers on conveyor. The unit shown is gas fired, and has a capacity of 30 to 120 pipe per hour, or 25 tons. The furnace is 22 feet wide and handles 20-foot lengths.

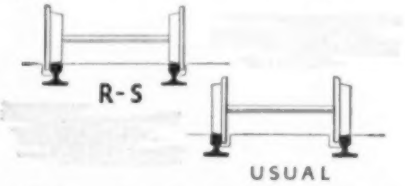


Similar furnaces are in use at U. S. Pipe Co. plants in Alabama and New Jersey; National Pipe Co. in Birmingham, James Clow Company, in Coshocton, Ohio, and the Lynchburg Foundry Company in Radford, Virginia.

A heater who lived in Duluth
Said maintenance charges, forsooth!
As high as they are
Demand we use R-
S Furnaces. Ain't it the truth?

In the Steel Industry, 8.2c per revenue dollar is the authoritative figure! R-S Furnaces help you to beat the average figure by a profitable margin.

No Binding of Wheels with R-S Car Hearth design. The conventional type of support with wheel flanges inside the rails sometimes leads to binding when thermal expansion causes the hearth to spread and widen the wheel-gage.



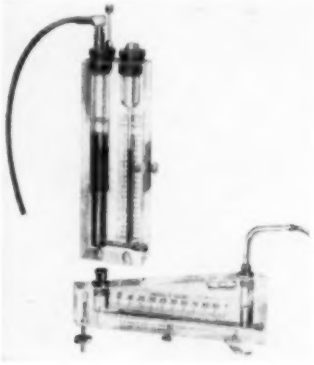
R-S car-hearth wheels have their flanges outside so that wheels function easily regardless of thermal expansion.

FURNACE DIVISION
R-S Furnace Corp.
PHILADELPHIA 44, PA.

(*Continued from page* 246)

matically controls temperature between 250 and 1900 F and reaches a maximum of 2000 F. It consumes 2000 watts at 110 v (ac only). Overall dimensions are 19 x 20½ x 21¼ in. and inside is 6 in. square with 3¼ in. throat additional. Weight is 148 lb.

Testing Instruments: F. W. Dwyer Mfg. Co., 317 South Western Ave., Chicago 12—New line of combustion testing instruments includes portable and stationary transparent CO_2 indicators, draft gages, manometers and accessories. Transparent CO_2 indicator is simple design and provides good visibility and accuracy. Made of stainless steel and clear plastic which is unaffected by the red indicating solution, the instrument is virtually unbreakable. Portable draft gage, also of transparent plastic, measures air velocities, drafts and slight



pressure changes. Scale graduations extend a full 5 in. with more than an inch of sliding adjustment.

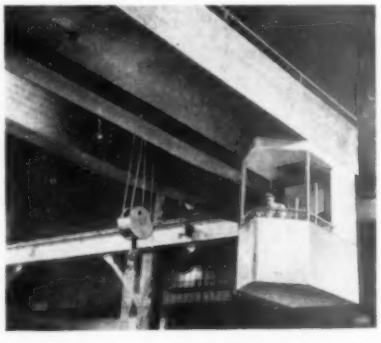
Air Regulator: A. Schrader's Son, division of Scovill Mfg. Co. Inc., 470 Vanderbilt Ave., Brooklyn 17, N. Y. —Air pressure regulator is adjustable to function in systems operating at 10 to 150 psi. Many of these regulators can be used in a system, one for each tool or air-operated machine to keep pressure at the equipment constant regardless of pressure variations in the main system. If an air tool is designed to operate at 100 psi and the line pressure is 150 psi, the regulator will deliver air to the tool at the pressure for which it is set (always less than lowest line pressure) saving wear on the compressor and reducing air waste. Regulator is furnished with each pressure gage.

Refractory Cement: Armstrong Cork Co., Liberty & Charlotte Sts., Lancaster, Pa.—Air setting refractory cement is designed for use as a bonding mortar or protective facing with fire brick and insulating fire brick. It has high plasticity and can be trowelled directly from the drum after long storage. It pours readily and is easy to thin with water to dip joint or facing consistency. Cement withstands abrasion, slagging and spalling as effectively as the brick itself, has a cold bonding strength of three times the 200 lb psi required by ASTM specifications and will withstand temperatures up to 2910 F.

Metal Sprayer: K & F Metal Spray Industries, 11204 Charlevoix Ave., Dept. P, Detroit 14—All electric metal sprayer uses ac or dc and requires air

at the rate of 3½ cfm at 30 to 40 psi. Temperature may be adjusted from 100 to 600 F and maintained within 1/10 of a degree. The ni-chrome wire of the heating units is embedded in a special refractory material completely encased in a sheath of high temperature chrome steel. Metal thicknesses from 0.00001 to ¼ in. can be sprayed on almost any material. Sprayers are available with 6, 12 or 24 cu in. pot capacity in horizontal or vertical types. Special alloy sprayers designed for higher temperature ranges and larger pot capacities are available.

Cranes: Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore Inc., Muskegon, Mich. — New cranes make use of color to increase safety fac-



tor in crane operation. Hoisting trolley, lower block and hook, platform handrail and edges and handrail on the cage are a brilliant orange which makes them stand out against the machinery blue of the end trucks and girders. The operator's cage interior is buff and the side panels and top of the cage are a light gray. Cor-

(*Concluded on page* 250)

WE KNOW WHAT THESE MACHINES CAN DO

ONE WAY to know your own product — forward and back, inside and out, all its innermost secrets—is to use it yourself. Use it a long time—hard; really "give it the business".

We do that in our own foundry with Arcade Molding Machines—treat 'em rough; impose upon them; really "pour it on".

It does us good to see how well they can "take it"—and keep right on giving their sturdy, accurate best.

No. 91 JOLT SQUEEZER

This popular and rugged machine is truly portable and easy to move on any kind of floor.

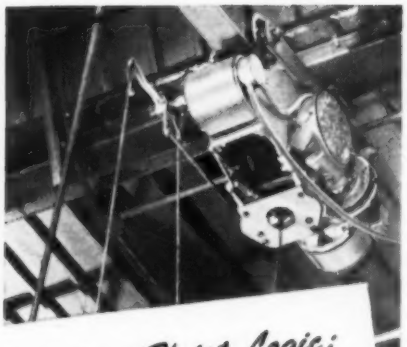
The squeezer head is pushed back with a touch of the fingers; and only a light pull-back effort is required for the squeeze operation.

Manual effort has been reduced to a minimum.

Let our engineers help solve your molding production problems. Literature on request

Expect news from Arcade shortly — news that will ***affect your business;*** *news about additional molding machines now being developed, to fit the needs of every type and size of foundry. If you're planning on new molding equipment, talk to Arcade engineers.*

ARCADE MANUFACTURING DIVISION ROCKWELL MANUFACTURING COMPANY FREEPORT, ILLINOIS



Modern Hoist Logic:

3-2 = LOWER COSTS!

—Yes, rock-bottom handling costs—*and* more output per hour! Here's the record: Heavy drums of chemicals had to be lifted to a raised vat—and lifted fast. The block and tackle formerly used required 3 men to get the proper lift speed. This ½-ton Reading Electric Hoist paid for itself in 2 months by keeping 2 men on their regular jobs and letting the third raise drums alone—in half the previous time! Let a Reading engineer help you get the same kind of handling results with a fast, smooth-working Reading Electric Hoist. Drop us a line today for full details. No obligation, of course.

READING CHAIN & BLOCK CORP.

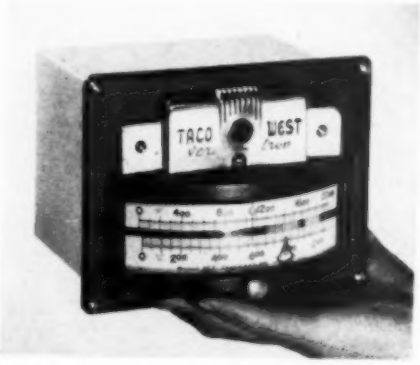
2108 ADAMS STREET • READING, PA.

READING HOISTS

(*Concluded from page* 248)

rugated aluminum sheathing along the platform serves as a guard against anything dropping from it to the floor underneath. Operator's cage design provides good visibility. Pictured here is a crane of 10 ton capacity and 55 ft span.

Pyrometric Controller: Taco West Corp., 2620 South Park Ave., Chicago—Two-position electronic controller is specially suited for direct installation on industrial furnaces. In operation, the control pointer is set at the desired tem-



perature and control is immediately established within a narrow temperature range. Instrument operates a heavy-duty relay system without any physical contact or reaction effect on the indicating pointer. The relay is built in and has a load capacity of 3 kw noninductive. Electronic control mechanism is stable, and the measuring system is well compensated for cold junction deviation, moving coil temperature coefficient, and magnetic errors.

Grinder: Black & Decker Mfg. Co., Towson 4, Md.—Six-inch heavy duty bench grinder is designed for grinding, tool sharpening, wire brushing and buffing. Steel wheel guards meet all safety requirements and are wide enough to accommodate a standard three-section wire wheel brush. U-shaped tool rests fit around the grinding wheel for improved support in tool sharpening. A machined hole is provided on the face of the grinder for mounting attachments commonly used on bench grinders.

Helmet: Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8—Designed for protection against high velocity abrasives in shot or sand-blasting operations, this helmet employs compressed breathing air under control of the wearer. It is made of aluminum with adjustable inner open cradle of strong webbing which distributes the 4½ lb weight of the assembly evenly over entire head. Hood of the assembly is made of rubber impregnated cloth fastened at the waist by two adjustable straps. Nonkinking hose connects air supply to a flow control valve at wearers' waist. Objectionable odors and foreign material are removed from the air supply by a replaceable cartridge filter, and a screen cover protects the view window from excessive abrasive wear.

Buffer: Bradford Machine Tool Co., 657 Evans St., Cincinnati 4—Heavy duty overhang buffer is adapted to long and deep work requiring maximum clearance. Buffer is belt driven by ball bearing motor, has positive shaft lock, magnetic starter, overload protection and under voltage release. Motor platform is adjustable for belt tension, and belts may be changed without removing housing from shaft. Buffer is available in power range from 3 to 20 hp, 2400 rpm or to specifications, with 220, 440 or 550 v, 2 or 3 phase, 50 or 60 cycle motors.

Fire Extinguisher: Bowser Inc., 1302 East Creighton Ave., Fort Wayne, Ind.—New type fire extinguisher provides unlimited supply of water fog for extinguishing fires and for shielding the operator from heat of the blaze. Water fog also dilutes vapors, washing the air so that it reduces the hazard of an operator being overcome by gas or smoke. Unit connects directly to an ordinary city water line. A 50-ft length of 3/4-in. high-pressure hose is racked in figure 8 position for fast removal

without kinking. Laboratory tests show a 20 ft fog projection at 50-lb nozzle with a 15.9-gpm discharge.

Electrode: Air Reduction Sales Co., 60 East 42nd St., New York 17—High nickel core wire and heavy extruded coated electrode produces machinable welds on cast iron. It is said to flow well, withstand hydrostatic pressure and makes sound multiple pass welds without danger of cracking. Weld and fusion zone is soft and easy to machine. Electrode may be used on either ac or dc and is available in 5/32 and 1/8 in. dium.

AXIVANE* FANS

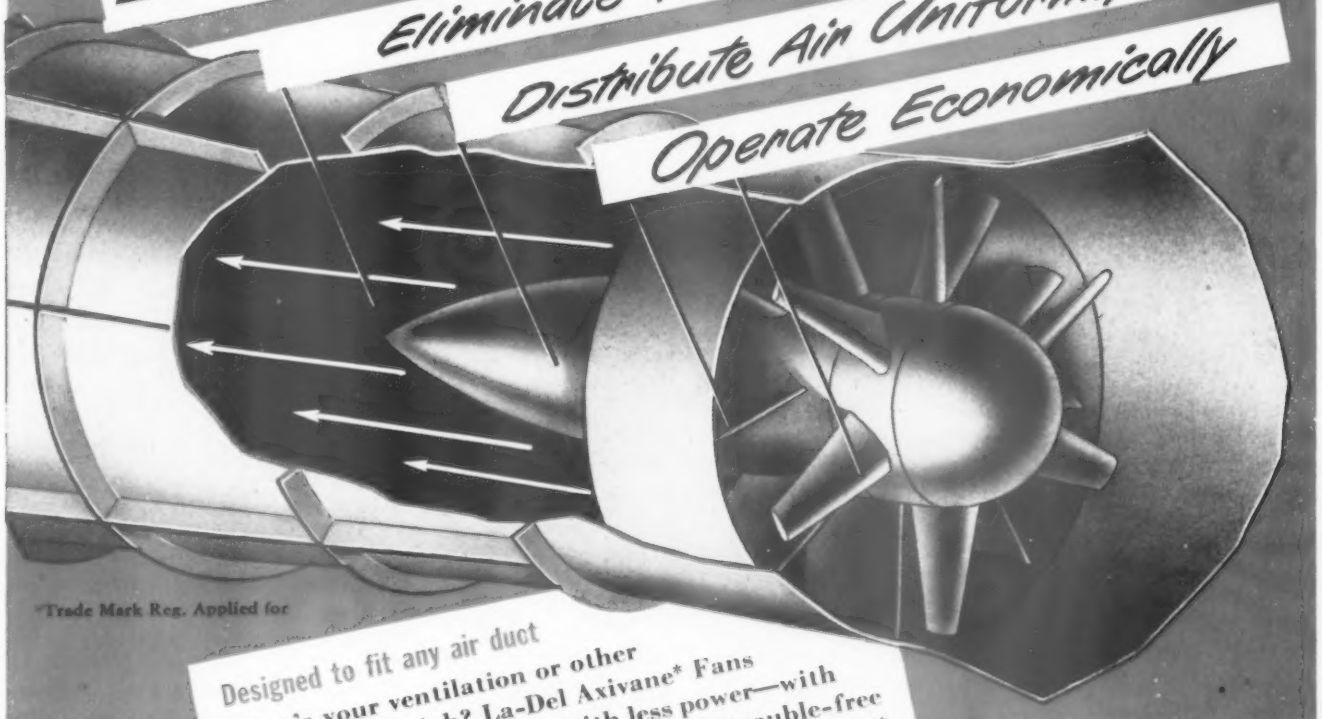
Guarantee Efficiency

LA-DEL FANS – Troller Designed

Eliminate Turbulence

Distribute Air Uniformly

Operate Economically



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Designed to fit any air duct

What's your ventilation or other air-movement job? La-Del Axivane* Fans can do it in less space and with less power—with easy, low-cost installation and quiet, trouble-free operation. ● As the only manufacturer of Axivane* Fans, let our engineers check with yours on futures.

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Consult a Joy Engineer—

LA-DEL Division

JOY MANUFACTURING CO.

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QUICK—
ACCURATE
Temperature Readings
in Non-ferrous
Molten Metals with

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HAND PYROMETERS

Accurate to Within a Fraction of a Scale Division

The XACTEMP PYROMETER makes possible better quality control and helps toward elimination of blowholes, burnouts, sand infiltration and other flaws due to incorrect temperature . . . affords a simple, effective means for accurate temperature measurement of molten, non-ferrous metals. Well-balanced, easy to handle . . . always ready for use and requires no preliminary adjustments.

Cast aluminum and brass construction. Indicator is of medium resistance not affected by thermocouple length . . . acts rapidly . . . provided with Alnico V magnet and direct-reading dial starting at 50° F. 43" stainless steel extension . . . standard 7" Marshall tip permits true readings below surface of metal. Made to give good service for years. Order at once to be sure of immediate delivery from stock.

Catalog No. MM701 $59.50
Complete with Thermocouple . .

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Ask about XACTEMP PYROMETERS for all-around general temperature checking. A full line of thermocouples available in stock.

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ELBOW ROOM IN THE FOUNDRY?

(*Continued from page* 83)

man. But the industry will need great numbers of research-minded men, from the front offices down to the cleaning rooms, who can be relied upon to convert everybody in and about the foundries to the research idea.

Let me quote from an article in the *Bent* of Tau Beta Pi; "Magazine writers, advertising men, lecturers and others have been able apostles of scientific research to the public. It now remains for a generation of smart young men to preach the gospel of research nearer home, to the men in our American manufacturing plants. . . . The researcher accumulates valuable information which the shop never uses; the plant official makes snap decisions when he ought to wait for research results. The young man who brings the two together may set the world afire."

Growth of the Industry—Reason number three for opportunity in the foundry industry stems from reason two. Prosperity seems to grow from research. At least, those industries have been consistently prosperous which have had a consistent research policy. General Electric, Westinghouse, Bell Telephone, Eastman Kodak, Lincoln Electric and the Dow Chemical Co. are familiar instances. I could continue the list indefinitely if there were time.

The principle applies in almost every field of endeavor. Consider the effect of research upon the practice of medicine and the health of the American people. And to shift the view quite sharply, consider the modern farm, and the dense, rich fields of grain and sturdy cattle which result from research.

One of these days, foundry research will catch on, so to speak, and the industry should enjoy a boom. In the nature of things, every industry should have at least one decent boom. The electrical industry has had its boom, and the steel industry and the lumber industry and the automobile industry and the motion picture industry and the radio industry and even the railroad industry, many years ago. But I have never heard of a boom in the foundry industry. It should have its turn very soon, and research will bring it on, or at least bring it on faster.

And, of course, when the industry prospers, foundry operators will be looking frantically for proficent technologists and skilled mechanics, and there you have opportunity and lots of it.

It all depends on whether the present generation of foundry owners and operators will go all out for scientific research, or whether they will let their competitor industries take the ball away from them.

There is much work to be done in the foundry industry. Recently I looked into a Palmer foundry handbook printed in 1919. It is still a pretty good handbook for the *average* foundry. I know of course, that there are many extremely modern foundries. But choose a foundry at random, the ordinary jobbing shop along the tracks in any industrial town, and you will find that the practice there is just about Palmer, 1919. On the other hand, a 1919 automobile instruction booklet, or a 1919 telephone installation manual is utterly obsolete today.

Immense tasks and projects confront the foundry industry, and when they are undertaken, exterior and surface evidence will appear everywhere. One might expect:

a. Comprehensive joint education programs in the industry.

b. Joint foundry research such as the leather manufacturers have endowed at the University of Cincinnati, the gas industry at the Illinois Institute of Technology, the railways at Purdue University, the paper manufacturers at Lawrence College and the textile industry at Charlottesville, Va.

c. Possibly even full-page advertisements for the foundry industry in the important magazines, similar to the advertisements for the American railways, the coal producers, the fruit growers and, before the war, the Southern Pine Association.

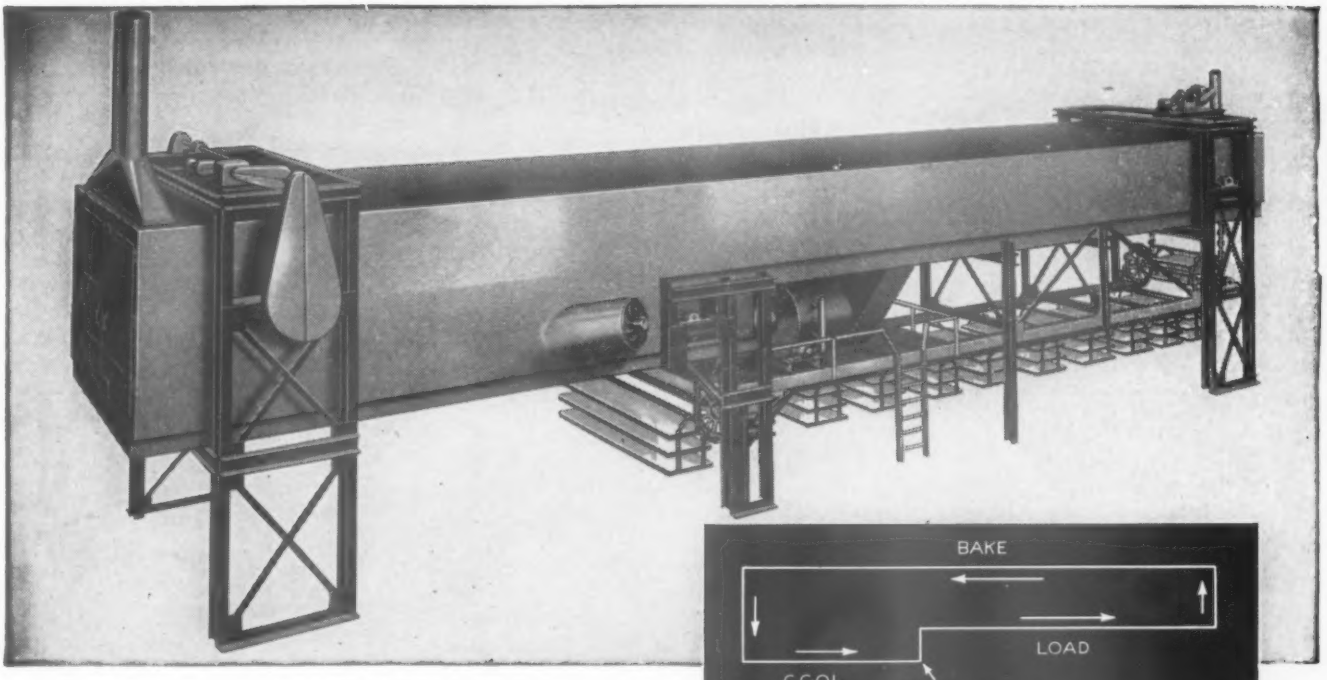
Foundry Presents Opportunities

There is plenty of work for the young men in the foundry industry, and for their older brothers, too. And that spells out opportunity.

But let's get a clear concept of opportunity. Many people today seem to believe that opportunity means a chance to evade work and responsibility, to get something for nothing. There is an old-fashioned notion that opportunity means a chance to work to special advantage —but to work just as hard as ever. If you cannot accept the older rather than the newer philosophy, don't try to get anywhere in the foundry industry—nor, indeed, in any other.

The older philosophy means to keep at it all day and every day, to tend to business, to get up a perspiration; to think and to plan, to read and to study; to become the best informed man in your shop on foundry technology and practice; to serve an apprenticeship if you can; to attend evening classes; to read the reports of the American Foundrymen's Association and the American

(*Concluded on page* 254)



The time-saving, space-saving, compact design of this new Horizontal Core Oven is characteristic of Young Brothers' Engineering. Into it went the skill and confidence of many years of experience . . . also a thorough knowledge of the job to be done and the production problems involved.

This new core oven can be installed in practically any building without making any major structural changes.

The coremakers are located right next to the oven so that they can load the cores directly on the moving racks thus eliminating the necessity of transporting them on hand trucks or a conveyor from the core room. The location of the coremakers, at the oven, also saves core room space.

The size of the loading racks can be varied and the shelves can be adjusted to accommodate cores of many sizes and shapes.

Besides allowing for the removal of exhaust gases at the point of greatest concentration, the new oven design provides an effective cooling zone for the cores and assures comfortable working conditions for the coremakers.

This New Horizontal Core Oven is Young Brothers' answer to the demand for better core baking equipment. It is YOUR answer to the need for lower production costs and higher operating efficiency.

New HORIZONTAL CORE OVEN . . . . . offers many cost saving advantages!

MEMBER

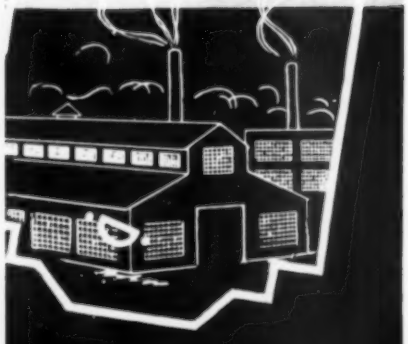
YOUNG BROTHERS COMPANY

6508 MACK AVENUE DETROIT 7, MICHIGAN

ESTABLISHED IN 1896

USE . . .

SCIENTIFIC · MATCH PLATES · Pressure Cast



The SCIENTIFIC CAST PRODUCTS Corp.

• CLEVELAND
1388-1392 EAST 40th STREET
CLEVELAND 3, OHIO

• CHICAGO
2520 WEST LAKE STREET
CHICAGO 12, ILLINOIS

(*Concluded from page 252*)

Society for Metals and the engineering and technical journals; to be thoroughly familiar with the cast metals handbooks.

And you foundry managers and owners, maybe there is in your shop an old grouch who collars your young men and says to them, "The foundry is a great game if you have iron lungs and a back like an ox," or "There is only one way up in this business and that's the hard way; hard and dirty and hot and dusty and smoky and smelly and unhealthy." If you have such a grouch in your plant, there are two alternatives:

a. If he is speaking the truth, clean up your shop, and quickly.

b. If the grouch is not telling the truth, and your shop is a good place in which to work, either make the grouch desist or drown him in the Grand River.

This brings us to the final and the most important item. Congratulations on the Donald J. Campbell Educational Fund of the Western Michigan Chapter of the American Foundrymen's Association! Fine business! I don't know of anything like it in any foundry community. This is the sort of thing which can do more than anything else to create the foundry opportunities about which we are talking.

And don't be disturbed if there are no borrowers from the fund for a number of years. Just now, most of the young men can get G. I. money for their education. Never mind. Invest the money prudently, get what interest you can, and the time will come when you will pat yourselves on the back for your wisdom in 1946. The fund is a farsighted, generous and highly intelligent project which will reflect everlasting credit upon the foundrymen of the district.

Bureau Makes Study Of Foundry Wages

Information on average hourly earnings for five occupations in independent foundries during October has been released by the U. S. Department of Labor, Bureau of Labor Statistics, Washington.

Earnings of hand coremakers and bench molders in ferrous foundries in the eight largest centers of the industry averaged from $1.35 to $1.63. The corresponding averages for patternmakers were $1.41 and $1.87; for sand mixers, 91 cents and $1.23; and for chippers and grinders, $1.04 and $1.38.

In general, the rates in nonferrous foundries tended to be somewhat lower than those in ferrous foundries in the same city. There were, however, exceptions, notably in the case of patternmakers and of other jobs in certain cities, particularly those on the West coast.

SALVAGING IRON CASTINGS

(*Concluded from page 148*)

machine. Five weld layers were deposited in the main area to be repaired. There were two beads to each layer, and a slight weaving technique was used to lay the beads. Each bead was peened with a pneumatic hammer to relieve internal stresses, and each bead was thoroughly cleaned with a wire brush before another bead was laid. After the major defective area had been filled in, the annealing passes were made to further reduce the hard zone. When completed, the major repair weld was from ⅛ to 3/16 in. above the normal surface of the flange face, as shown in Fig. 4. Seven electrodes (0.7 lb) were used for this weld. Less than a single electrode was used on the defective boss and the other surface flaws. Approximately 30 minutes was spent welding.

After welding, the casting was sent to the shop for machining. The flange face was turned down in a lathe at 185 surface feet per minute using a carbide cutting tool with a 0.017-in. feed rate. The flange bore was machined using the same lathe speed but a slightly slower rate of feed—0.012-in. A high-speed tool steel cutter was used for the bore. The lathe was stopped half way through the first cut on the flange face to get the picture shown in Fig. 5.

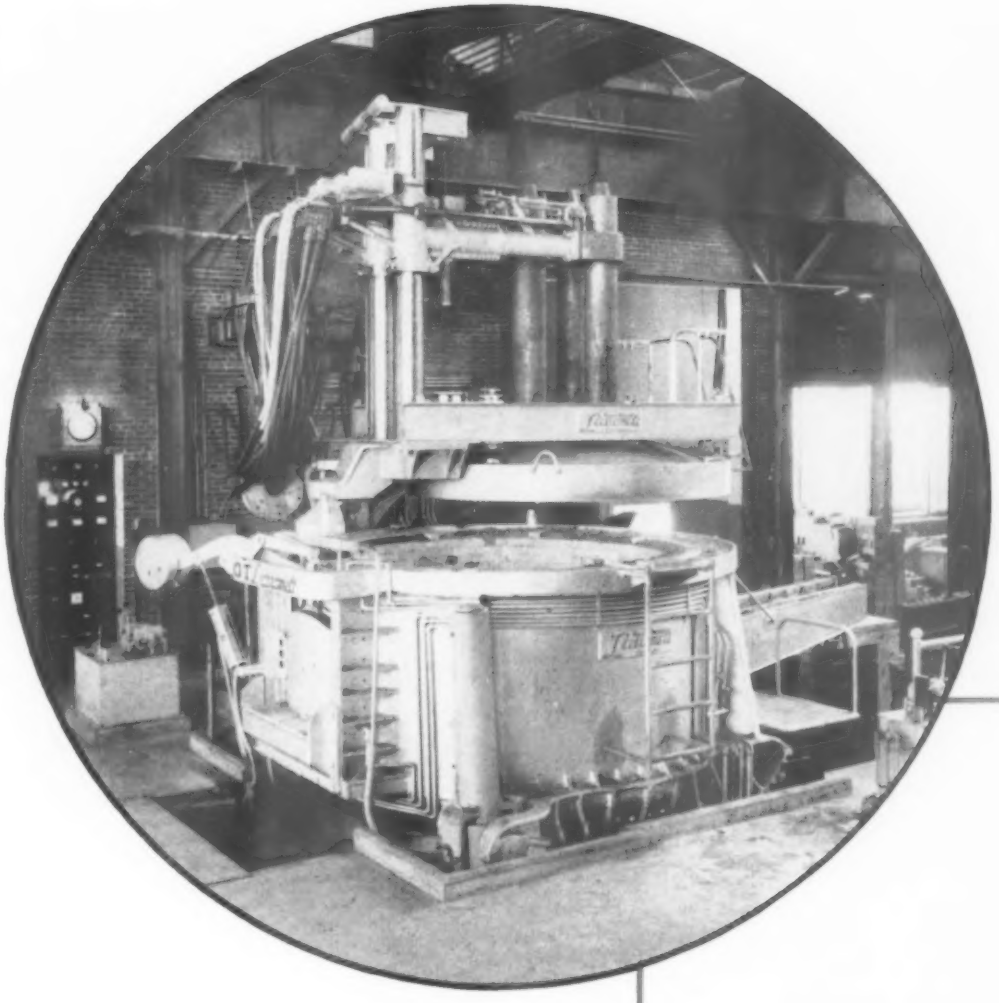
Under normal manufacturing procedure the machined face of the pump casing would be drilled and tapped at regularly spaced intervals. However, in order to test the quality of the repair, four 7/16-in. holes were drilled; one squarely in the fusion zone; one in the cast iron about 2 in. from the weld; and two in the weld deposit. A fifth hole was drilled in the boss where the large blowhole had been filled in.

After drilling, the five holes were tapped. In each machining operation the lathe and drill press speeds and feed rates were those that would have been used had the casting been a perfect one on the production line.

Views of the welded and machined casting's finished flange face is shown in Figs. 6 and 7.

Plan ASME Meeting

Annual 1947 meeting of the American Society of Mechanical Engineers will be held in Atlantic City, N. J., Dec. 1-5. Headquarters for this 68th annual meeting will be the Hotels Chalfonte and Haddon Hall. Some 200 engineers, scientists and industrialists are expected to take part in the program consisting of five days of continuous technical day and evening sessions.



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The swing aside roof and drop bottom bucket charge features of the Moore Rapid Lectromelt offer these distinct advantages to users . . .

Longer refractory and superstructure life

Rugged, long lasting construction

Ideally suited for using bulky scrap

Low maintenance costs

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Manufactured in

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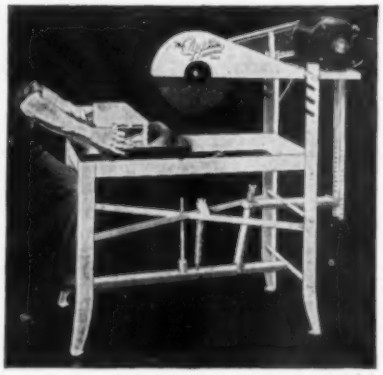
Your Special Size and Shape Brick or Concrete Block can now be "Tailor-Made" at a moment's notice!

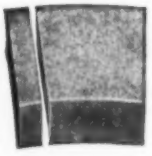


The new Clipper Multiple Cutting Principle makes possible faster cutting of every masonry material regardless of hardness.

Here are a few typical examples of the speed and accuracy with which concrete products and fire brick can be cut.

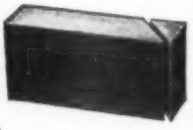
This concrete block, converted into a special size, was cut completely in two in 19 seconds.

One of the many intricate cuts performed on first quality clay brick for heat treating furnaces —made in 8 sec.



Rotary Kiln Blocks, cut to size for "key" bricks in rotary kilns, require only 10 sec. for completion of cut.

Basic refractories for steel furnaces or cement kilns must be accurately installed. This magnesite brick was cut in 12 seconds!



CLIPPER MFG. COMPANY
2800 Warwick, Kansas City 8, Mo.

NEW TRADE PUBLICATIONS . . .

BLAST CLEANING: Pangborn Corp., Hagerstown, Md.—Bulletin 214 describes the company's airless blast cleaning equipment and illustrates the engineering principle involved in the application of centrifugal force to direct abrasive against work to be cleaned with sufficient velocity to remove scale and burnt sand from castings and other metal parts. Case studies of performance and typical applications to all types of blast cleaning equipment are included in the book.

BALL BEARINGS: Dodge Mfg. Corp., Mishawaka, Ind.—Bulletin A-120 deals with the company's line of ball bearings. It gives pertinent engineering information covering pillow blocks, hanger bearings, flanged units, take-up units, cylindrical units and steel frame ball bearing take-ups. Selection tables proved a convenient means of selecting the right bearing for any application within the size and load range of the line.

FLOOR COVERING: Stonhard Co., 401 North Broad St., Philadelphia 8—Folder describes the overlaying or patching of worn concrete, wood, brick or composition floors. Only ½-in. thickness of this material is needed to resurface a floor and it is said to last longer than any other type of floor subjected to the same conditions. Material is spread on with a trowel.

WELDING: C. E. Phillips & Co., 2750 Poplar St., Detroit 8—Instruction folder for making machinable arc welds in gray iron castings lists current settings, arc manipulation and preheating temperatures. A weld-tempering method which reduces the tendency to cross checking in the weld metal is described.

HOISTS: David Round & Son, Broadway & Henry Sts., Cleveland—Bulletin SU-40 describes hoists ranging from ¼ to 20-ton capacity. Hoists are of conventional high speed spur gear type, have mechanical efficiency of approximately 80 per cent and are equipped with ball bearings and steel load-bearing parts.

DIAMOND TOOLS: Desmond-Stephan Mfg. Co., Urbana, O.—Bulletin D-8 gives full dimensional data and prices on diamond tools and nibs. Hand tools, wheel dressers for valve grinding machines and straight shank tools and nibs are listed. Pointers on proper use of the tools are included.

ALUMINUM CASTINGS: General Aluminum Mfg. Co., 3027 East 55th St., Cleveland 4—Short treatise on permanent mold and sand cast aluminum alloys and tables dealing with alloys, their composition and properties for both methods of casting is presented by the company.

TRACING AND REPRODUCING: Industrial Sales Division, Eastman Kodak Co., 343 State St., Rochester 4, N. Y.—Booklet describes a reproduction process for transferring working diagrams, legends, designs, or other line work from a drawing to fabricating materials. Another booklet describes a new translucent tracing material, developed to provide clean, easy-to-read engineering prints. Pencil or ink drawings on the material may be used as originals for photographic printing or the material can be used for overlay in the field of commercial art.

ATMOSPHERE GENERATORS: Bellevue Industrial Furnace Co., 2971 Bellevue Ave., Detroit 7—Endothermic and exothermic furnace atmosphere generators and their application to operations in heat treating are described in a 12-page catalog. The former types are built in sizes to generate 650 to 60,000 cu ft per hr, and the latter types from 350 to 60,000 cu ft per hr. Typical applications are for bright or clean annealing, brazing and soldering, bright hardening and tempering, sintering and coloring of Pyrex glass.

SPRAY BOOTHS: Schmieg Industries Inc., 302 Piquette Ave., Detroit 2—Folder presents information on removing paint overspray in a swiftly-moving stream of air that travels horizontally from the work into a solid curtain of water that cascades down a perpendicular flood sheet at the back of the booth. Typical layouts are illustrated. Installations are designed and built to fit both plant and product.

REFRACTORY WALLS: Geo. P. Reintjes Co., 2517 Jefferson St., Kansas City, Mo.—Condensed catalog C-46 sets forth some of the problems involved in burning fuels within heat enclosures and shows the solutions this company has developed in the bricking in of boilers and furnaces with suspended walls.

FURNACE: Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.—Bulletin 27 describes principles and advantages of induction heating and melting and shows ways to use high frequency to speed production, reduce costs, and hold closer tolerances in melting, heating for forging, brazing, annealing and other jobs.

COUPLINGS: Falk Corp., 3001 West Canal St., Milwaukee 8—Bulletin 4100 helps in the selection of the correct coupling for each job. It gives detailed illustrations and descriptions of the company's Steelflex couplings. Complete selection tables are provided for both motor and turbine applications.

MAGNETIC SEPARATORS: Homer Mfg. Co. Inc., 436 North Main St., Lima, O.—Folder illustrates typical permanent magnet separator applications for use in eliminating tramp iron and steel particles and pieces during manufacturing or processing operations.

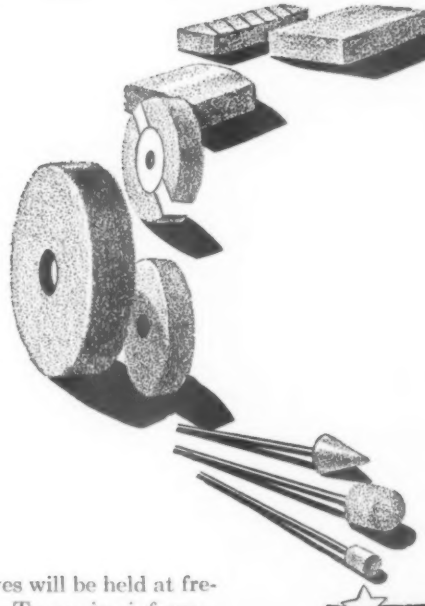
SAND CONTROL: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—News letter reviews some of the advances made and new equipment available in sand testing equipment for better sand control in the foundry.

SILICONES: Dow Corning Corp., Midland, Mich.—Literature, charts and graphs in this booklet describe the properties of these organo-silicon-oxide poly-

(*Concluded on page* 258)

BARGAINS IN ABRASIVES

WIDE VARIETY OF TYPES AND NO DELAY IN DELIVERY



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Sales of abrasives will be held at frequent intervals. To receive information on future sales, write to the Regional Offices listed below asking that your name be placed on their mailing lists.

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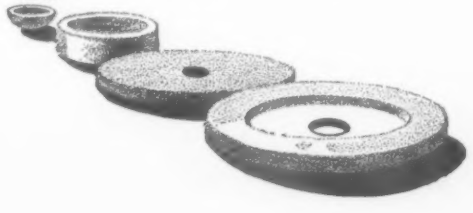

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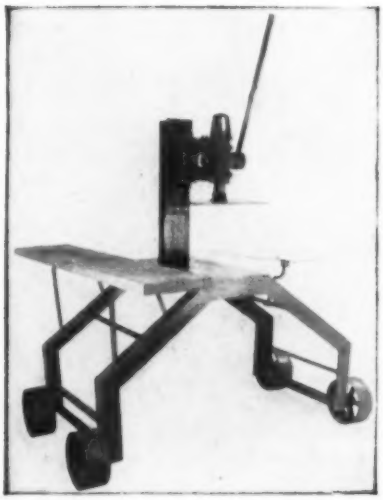


PORTABLE HAND SQUEEZER R-10

PIONEER

MANUFACTURING CO.

Molding Machine Manufacturer for Over 20 Years

MILWAUKEE (West Allis) WISC

(*Concluded from page 256*)

mers. Different types are available for use as foam inhibitors, mold lubricants and release agents, insulation of ignition systems and high frequency communications equipment, special lubricants, pump fluids, etc.

CASTINGS AND PATTERNS: Howard Foundry Co., 1701 North Kostner Ave., Chicago 39—Booklet is prepared for the purpose of promoting a broader understanding of the possibilities of casting as the answer to many metal forming problems. It deals with all of the procedures involved in casting aluminum, magnesium, bronze, brass and semi-steel. Convenient compilations of technical information and casting specifications will be of particular interest to engineers and purchasers in simplifying design and procurement problems.

METALLURGY: Tempil Corp., 132 West 22nd St., New York 11—Color chart, "Basic Guide to Ferrous Metallurgy," shows in schematic form information on heat treating, processing, welding and general fabrication of steels containing up to 0.9 per cent carbon. Chart shows working characteristics of steels at temperatures from minus 300 to 2900 F. Temperature ranges are in 19 colors approximating the characteristic hot-body radiant hues.

WELDING AND CUTTING: Wall Chemicals Division, Liquid Carbonic Corp., 1454 West Randolph St., Chicago 7—Catalog of gas welding and cutting equipment and supplies features welding and cutting torches, single stage regulators, welding and cutting outfits and a variety of special purpose torches, tools and accessories.

INSULATING VARNISH: Chemical Dept., General Electric Co., Pittsfield, Mass.—Booklet contains complete technical and application data on insulating varnishes, including specifications, electrical properties, film properties, cure and aging, chemical properties and baking and air drying cycles of each type.

FURNACE: Eclipse Fuel Engineering Co., Rockford, Ill.—8-page booklet illustrates and describes company's line of Rotair recirculating air-draw furnaces, gas-fired and designed for heat treating below 1250 F. Booklet covers operating data, sizes and specifications in detail.

CASTINGS NEWS: U. S. Reduction Co., Box 30, East Chicago, Ind.—News of current developments in production and use of aluminum castings is culled and condensed from trade publications in a new monthly bulletin, "USCO News Casting."

ELECTRODES: Harnischfeger Corp., 4405 West National Ave., Milwaukee 14—Booklet lists company's line of electrodes for welding cast iron, mild steels, alloy steels, stainless steels and for hard surfacing. Some of the company's welding equipment is also described.

ABRASIVE: Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul 6, Minn.—Information of interest to manufacturers of cast, stamped and machined metal parts which require a final deburring or finishing process is contained in 12-page booklet. Properties of the abrasive are described, and a typical finishing operation on an aluminum die casting is illustrated.

LABORATORY APPARATUS: Eberbach & Son Co., 200-06 East Liberty St., Ann Arbor, Mich.—"Announcer of Scientific Equipment," No. 47-3-26, company house magazine, has as its main article the background and development of modern analytical balance. Other articles deal with current developments in laboratory apparatus. Issues of this periodical endeavor to keep research, control and development laboratories up to date on new items.

MAGNETIC CRANE CONTROL: Westinghouse Electric Corp., P.O. Box 868, Pittsburgh 30—Five types of ac magnetic crane controls for handling any type of load are described in new booklet. Descriptive information, wiring diagrams, performance curves and an application guide to aid in selecting the type control best suited to any application are included.

LATHES: South Bend Lathe Works, 299 East Madison St., South Bend 22, Ind.—Catalog 13-F describes 13-in. swing, quick change gear and toolroom lathes. Quick change gear box has gear combinations for cutting 48 pitches of screw threads—right or left hand—and 48 power longitudinal feeds and cross feeds. Fully enclosed motor provides eight spindle speeds from 34 to 875 rpm.

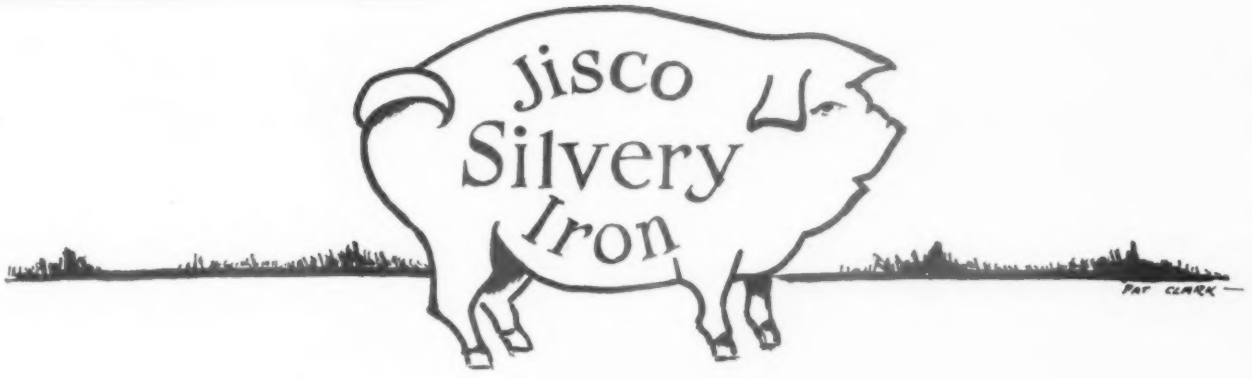
DUST CONTROL: American Air Filter Co. Inc., 266 Central Ave., Louisville 8—Bulletin 272 A contains specifications and descriptive data about the company's type D dynamic precipitator in which the functions of exhauster and dust separator are combined in a single unit. It is made in 13 sizes ranging in capacities from 100 to 15,000 cfm.

PYROMETERS: Illinois Testing Laboratories Inc., 420 North La Salle St., Chicago 10—Bulletin 4361 deals with the company's single and multi circuit pyrometers. Bulletin 4257 describes the hand-held portable pyrometer for quick, accurate temperature readings of flat or curved, moving or stationary surfaces.

FILES: Grobet File Co. of America Inc., 421 Canal St., New York 13—Purchasing guide and reference booklet lists 3566 different patterns, sizes and cuts of hand and machine files and rifflers in addition to rotary and deburring files and countersinks.

MAGNETIC PULLEYS: Magnetic Engineering & Mfg. Co., Clifton, N. J.—Catalog 146 describes and illustrates design and construction of air-cooled and solid magnetic pulleys. Table of standard sizes, giving dimensions, weights, capacities, etc., is included.

HOIST: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.—Bulletin H-100A on roller-chain electric hoists of ¼, ½ and 1-ton capacities is available. Booklet analyzes the need for hoists and gives complete specifications, speeds, and prices.



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From a message to the Congress by Andrew Jackson.

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The BUDA Chore Boy offers foundrymen a proved method for cutting time and expense in bulk hauling operations. Having a remarkably low first cost, together with unusually low operating and maintenance costs, this gasoline engine powered "truck of a thousand uses" has paid for itself in a short time in rapid handling of rough castings, sand, slag, coke and coal, etc., for many foundries.

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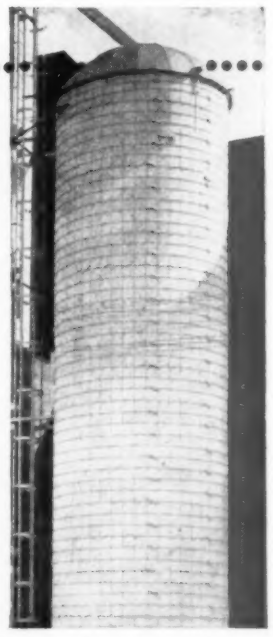

Where ground is limited, valuable space can be saved by storing flowable bulk materials in Neff & Fry super-concrete stave silos. What's more, conveying distances are shortened, which reduces the cost of labor and equipment.

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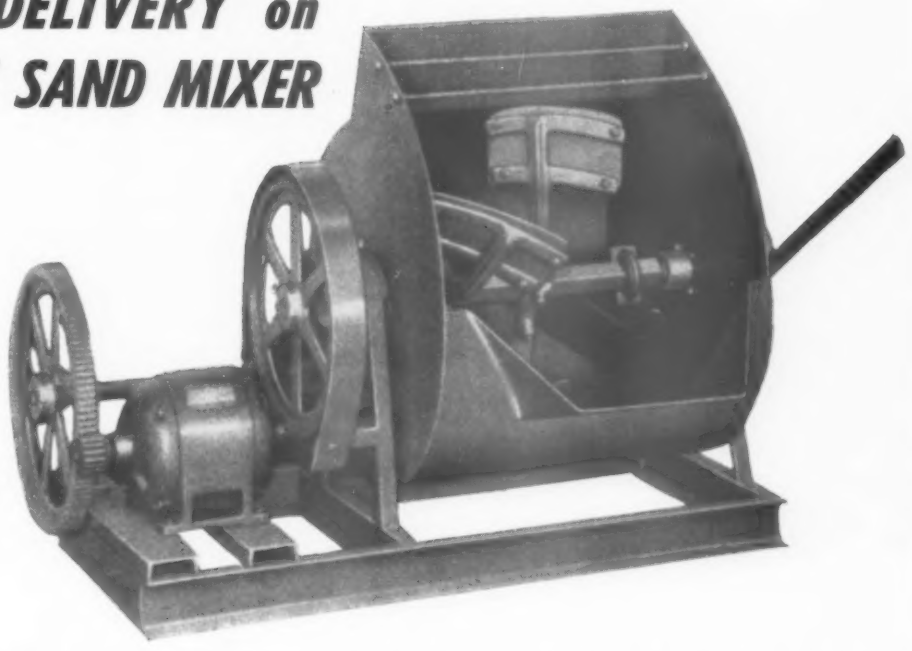

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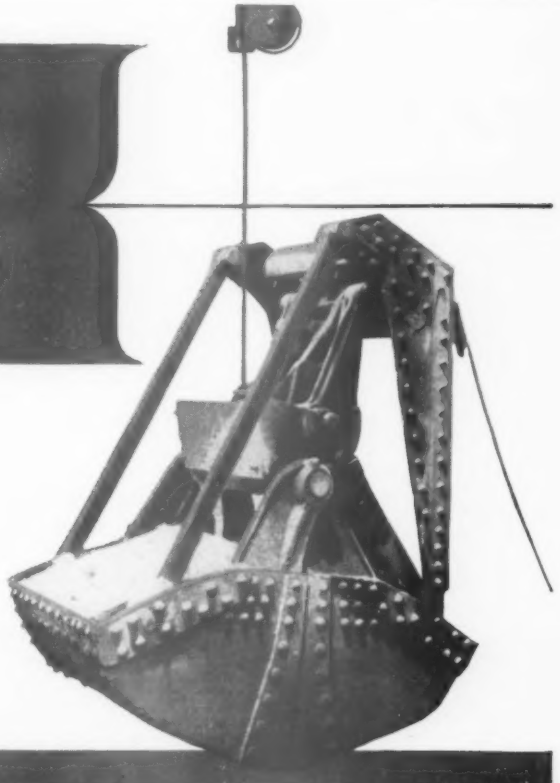

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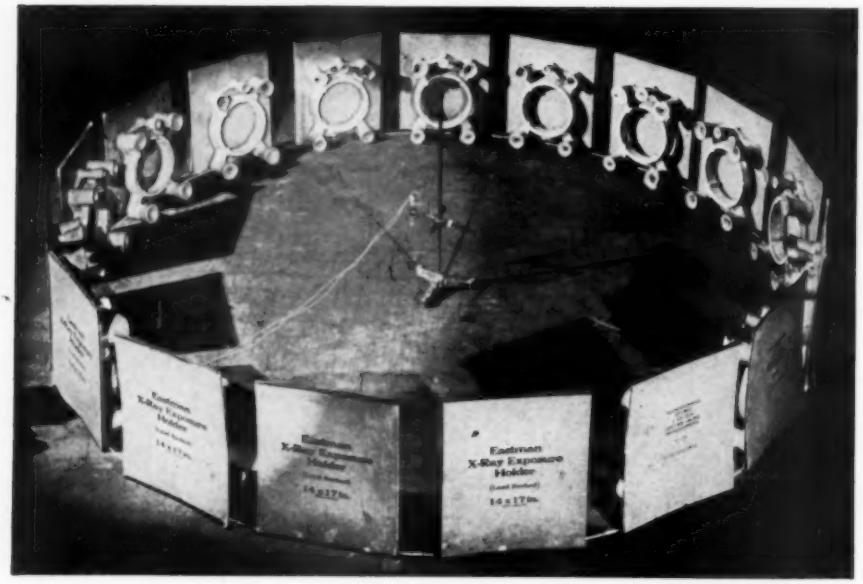

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"Directional solidification" can easily be studied by the set-up illustrated in the photograph—to indicate the best method of casting with a minimum of defects in the casting itself.

Radium has become a new foundry tool which directly effects an increase in yield. It permits accurate determination of the proper procedure in gating and risering "tough" castings. Seventeen cylindrical castings were radiographed simultaneously by Crane Co. to ascertain the most productive and economical foundry practice.

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"BRANFORD" FLASK RAPPERS are cutting flask cleaning time enormously in many foundries. Labor and material costs are still rising. Now is the time to install a "Branford" Flask Rapper. Labor expense is cut to a minimum and flask damage entirely eliminated.

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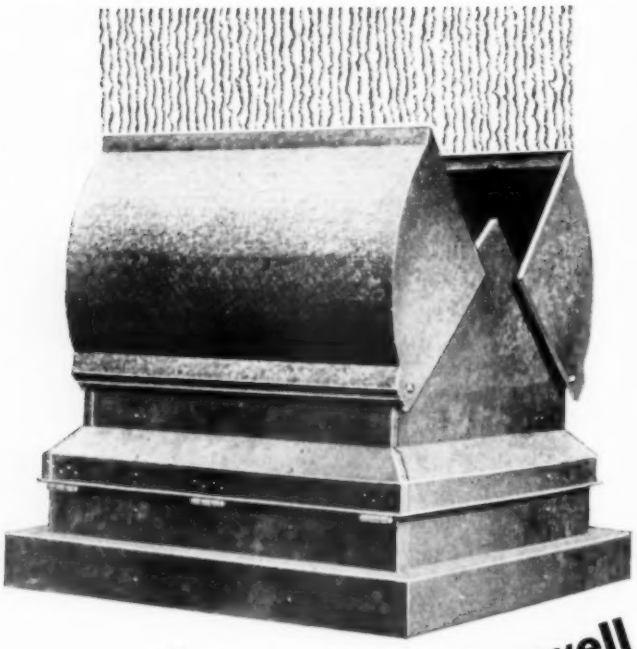

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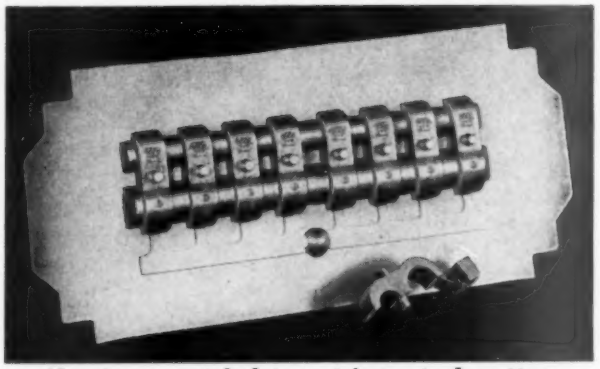

Aluminum matchplate cast from single pattern

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Get more output with safety. That means, with greater accuracy. Foundrymen are thus helping their profit by using our pressure-cast matchplates and cope and drag plates. Single or multiple pattern matchplates cast under pressure in plaster molds—that's the proven answer to today's urgent production needs.

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Pressure-Cast MATCHPLATES
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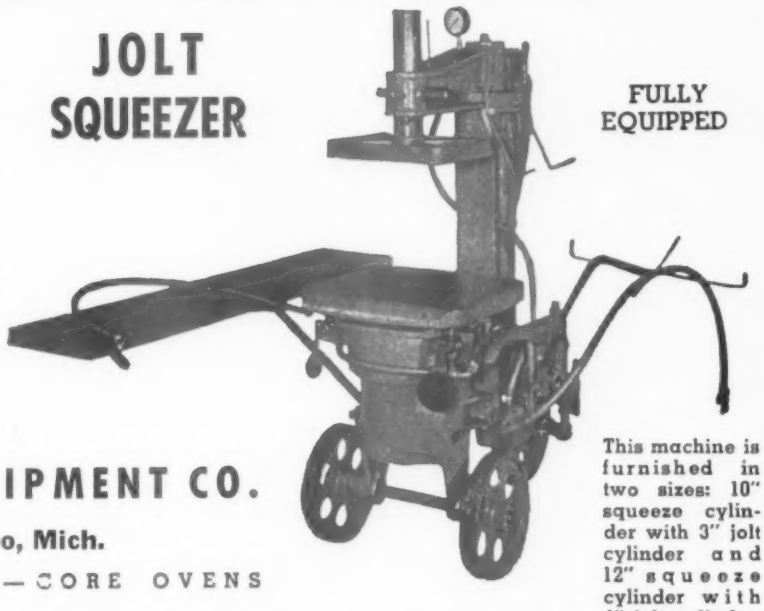
HAYNES EQUIPMENT

JOLT SQUEEZER

FULLY EQUIPPED

● The post and squeeze cylinder on the HAYNES JOLT SQUEEZER is cast all in one piece. There are no bolts or screws in this machine. The top of the post is machined on top with a 2 7/16" cold rolled shaft which the swing arm swings on.

This is a portable machine with three wheels, two in front, one in back, zerk fittings on all moving parts. Comes equipped with air gauge, pop-off gauge and a pin on top of the arm for a gate horn.



This machine is furnished in two sizes: 10" squeeze cylinder with 3" jolt cylinder and 12" squeeze cylinder with 4" jolt cylinder.

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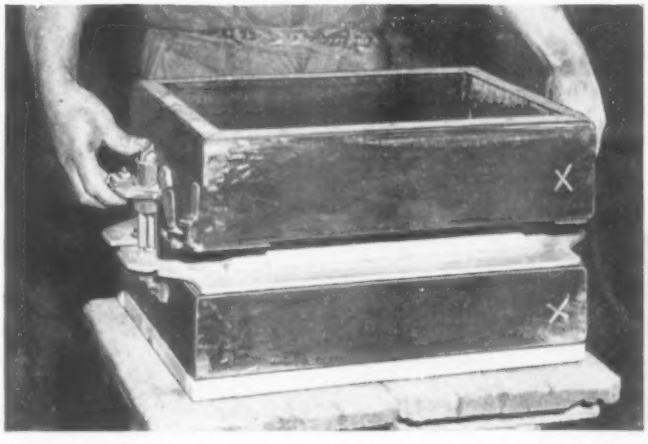

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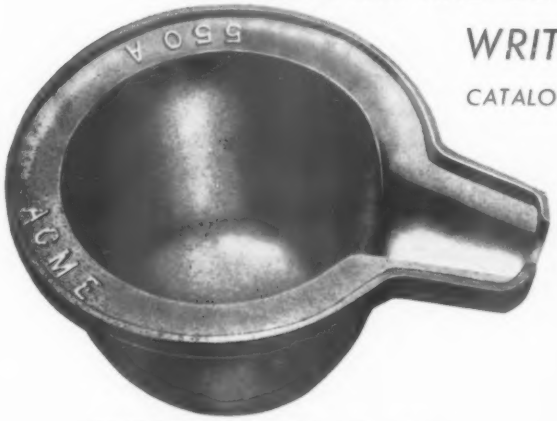

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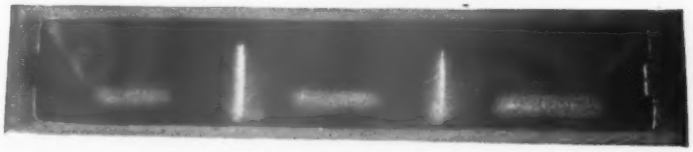

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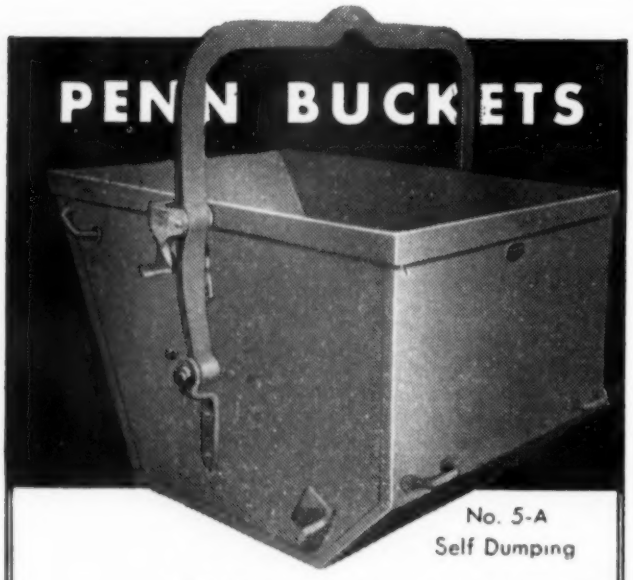

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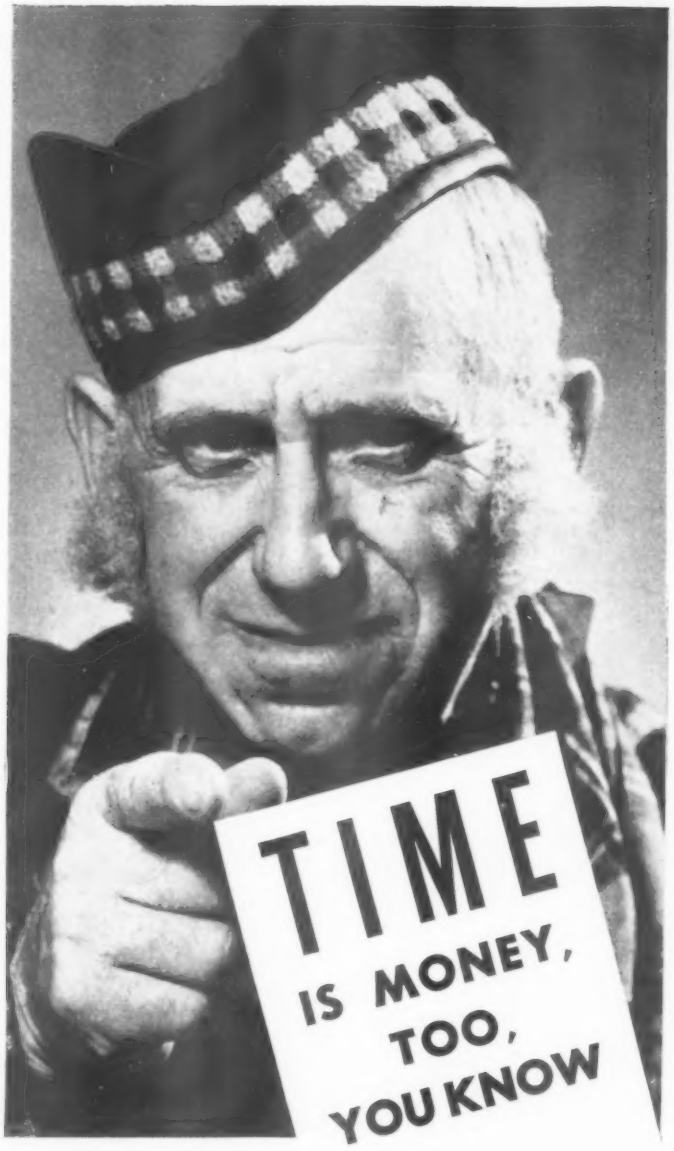

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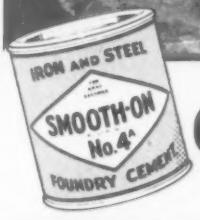

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Protect Your Good Castings This Way:

UNSOUND castings should of course be rejected. But good, sound castings that happen to show up with blow holes, sand holes, pock marks, dents or other minor surface flaws shouldn't be allowed to risk being rejected.

Smooth-On No. 4 Foundry Cement makes surface defects practically invisible. You apply it like putty. No heat necessary. It hardens like the casting metal itself. Matches color and texture and may be filed or machined smooth. Inexpensive—a few cents' worth has often saved a costly casting from rejection.

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If you are not already using Smooth-On Foundry Cement, we will send you a generous sample to test on your own castings. Check the grade you would like to try and mail the coupon. We'll send you also the 40-PAGE SMOOTH-ON HANDBOOK showing many other money-saving uses for Smooth-On Iron Cements.

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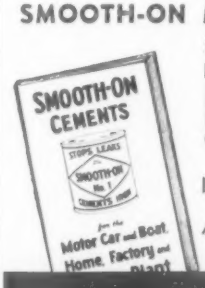
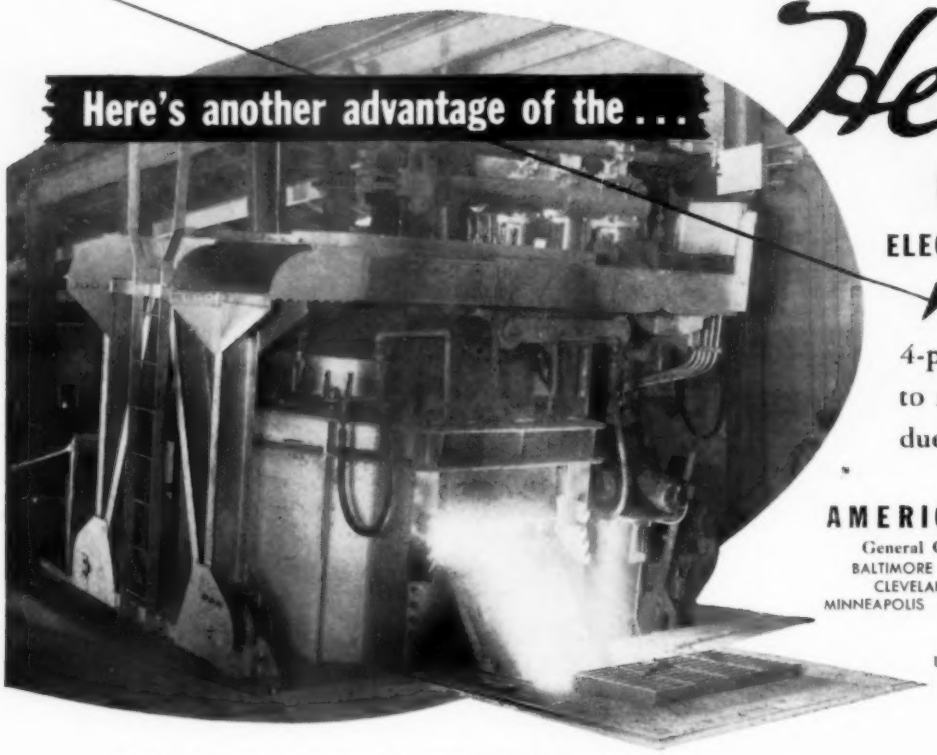


***Do it with* SMOOTH-ON**



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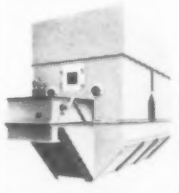

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Picked up at the point of origination—BEFORE *any damage can be done*—dust and fumes ride an air stream through the ducts to the Collection Unit. Here CENTRI-MERGE goes into action—washing—scrubbing—pounding out the dust and dirt in a tornado of cleansing water. Dust particles are deposited—under water—in a sludge tank at base of Unit.

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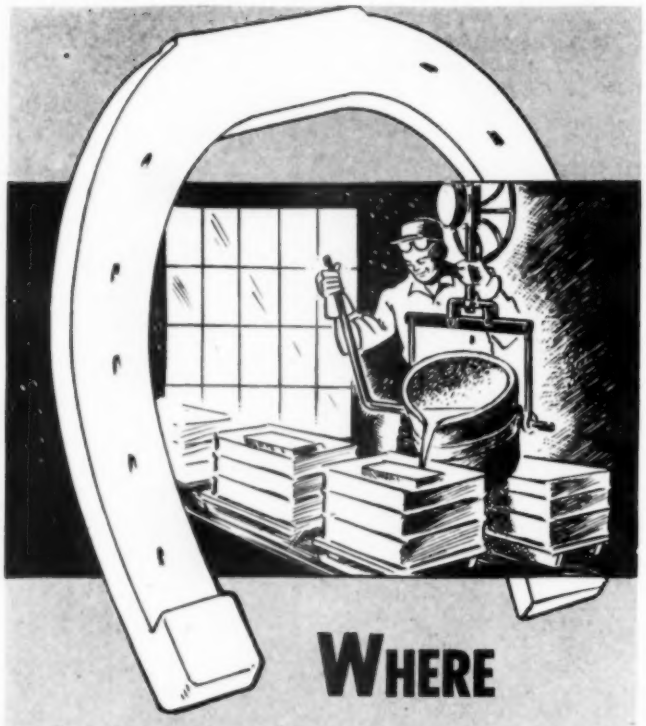

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HELPFUL LITERATURE

NOTE TO READERS: If you will check the item or items described which particularly interest you, we will be glad to request the manufacturers concerned to send you their literature. Use the attached postal card

1. Electric Furnace

American Bridge Co.—24-page illustrated booklet describes the Heroult electric furnace, presents its features and gives table of types, sizes, capacities and transformer ratings. Advantages of use under various foundry conditions are set forth.

2. Respiratory Equipment

Pulmosan Safety Equipment Corp.—36-page illustrated catalog covers complete line of respiratory equipment including respirators, masks, hoods and helmets for industrial use. Tables of recommended units for wide range of industrial gases are included.

3. Overhead Traveling Cranes

Victor R. Browning & Co.—28-page illustrated brochure describes Browning electric overhead traveling cranes in wide range of industrial applications. Units in from 3 to 150-ton capacities are presented and design, construction and operating features are covered.

4. Foundry Mechanization

Allis-Chalmers Mfg. Co.—20-page illustrated booklet No. 07B6092A describes line of equipment for mechanization of foundries. Included are shakeouts, casting cleaning equipment, sand conditioning and reclamation equipment, motors, drives and controls, cupola blowers, arc furnace controls and accessories, mercury arc converters, centrifugal casting equipment and power generation and distribution equipment.

5. Arc Welding Machines

Westinghouse Electric Corp. — 16-page illustrated bulletin No. B3548 lists three reasons in favor of alternating current welding. Application advantages are given and performance charts are included. Three-hundred, 400, 500 and 1000-ampere heavy duty welding machines are described and electrical specifications given.

6. Flexible Couplings

Thomas Flexible Coupling Co.—58-page illustrated engineering catalog includes complete engineering data, specifications and application information on fourteen types of flexible couplings for industrial uses. Dimensions, misalignment and float capacities, and tables of horsepower ratings and service factors are included.

7. Industrial Trucks & Cranes

Elwell-Parker Electric Co.—Illustrated catalog of basic industrial truck and crane models for 1947 includes principal specifications for 31 models, including low lift types with and without crane units; high lift platform trucks; fork type; cranes; stationary bed load carriers and tractors; all available with either gas-electric or electric drive.

8. Universal Testing Machine

Detroit Testing Machine Co.—Illustrated bulletin No. WT-3 gives specifications and applications of universal testing machine for tensile, transverse and compression testing.

9. Welding & Cutting Equipment

Wall Chemicals Div., Liquid Carbonic Corp.—28-page illustrated catalog No. AD 3729 covers Gasweld welding and cutting equipment and supplies. Welding and cutting torches, single stage regulators, welding and cutting outfits and variety of special purpose torches, tools and accessories are featured.

10. Soda Ash

Pittsburgh Plate Glass Co., Columbia Chemical Div.—6-page folder form No. A-202 describes light and dense soda ash and covers chemical and physical characteristics.

11. Electric Lift Truck

Lift Trucks, Inc.—6-page illustrated catalog describes motorized HydroLectric lift truck with 4000-pound capacity. Specifications are given and design and operating features are outlined.

12. Magnetic Pulleys

Stearns Magnetic Mfg. Co.—24-page illustrated catalog No. 303 contains descriptive data; specifications; information on selecting for proper size, material and capacities; trajectory charts; use of double magnetic pulleys and application data on magnetic pulleys and magnetic pulley separators.

13. Power Belt Conveyors

Rapids Standard Co.—32-page illustrated catalog No. 31-C5 contains complete information on line of power belt conveyors for all types of materials handling. Suggested uses and typical installations are shown. Features and advantages are outlined.

14. Electric Motors

Brown-Brockmeyer Co.—6-page illustrated bulletin No. 5000 presents data on complete line of electric motors with ratings from 1/8 to 30 horsepower. Ten types are included.

15. Centrifugal Castings

Ampco Metal, Inc.—4-page illustrated bulletin No. 53A lists ten benefits derived by users of bronze centrifugal castings. Table of casting size range is included.

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16. Turret Trucks

Salsbury Motors, Inc.—8-page illustrated bulletin No. 4602 presents details of Turreteer, Turretug and Turretruk, three models of turret trucks for industrial use. Design, construction, dimensional and specification data are given.

17. Film & Photograph Storage

Eastman Kodak Co.—16-page booklet describes recommended methods of storage of Microfilms, sheet films and prints. Physical protection to materials as well as methods of filing for ready reference are covered.

18. Transverse Testing Machine

Steel City Testing Machines Inc.—2-page illustrated catalog sheet describes model TR-1 transverse testing machine with 10,000-pound capacity. This highly sensitive machine is hydraulically operated.

19. Portable Air Tools

Rotor Tool Co.—44-page illustrated booklet No. 30 entitled "How to Cut Costs with Rotor Air Tools" contains operating information on grinders, drills, sanders and nut setters. Specifications, applications and advantages of use are covered.

20. Material Level Indicator

Fuller Co.—8-page illustrated bulletin No. I-3 presents technical and application data on Fuller material level indicator for storage bins and silos. Installation and typical applications for measuring dry materials in storage are shown.

21. Welding Rods

Eutectic Welding Alloys Corp.—4-page illustrated bulletin No. E-2 provides information on Eutectic low temperature welding rods for use with torch, furnace or arc welding. Specific applications are given and technical data are included covering bonding and remelting temperatures, Brinell hardness, strength, color match, etc.

22. Electric Lift Truck

Lewis-Shepard Products, Inc.—8-page illustrated booklet entitled "New Power Jacklift" describes 2 and 3-ton capacity electric traction, electric lift and electric brake equipped lift truck in platform and pallet models. Fingertip control is featured.

23. Core Baking

V. L. Smithers Laboratories—4-page illustrated folder "Baking Foundry Cores" is intended to serve as introduction to series of reports devoted to application of high frequency dielectric heating to foundry cores. Individual reports will cover such subject as commercial binders, baked tensile strength, crushing strength, permeability, hardness, collapsibility, core shape, handling metal inserts and production.

24. Foundry Design & Equipment

A. A. Wickland & Co.—4-page illustrated bulletin discusses engineering services available for foundry plant layout and equipment design. Typical plant interiors, floor plan of modern malleable foundry and other data are given.

25. Arc Welding Cable

General Electric Co.—4-page illustrated leaflet No. GEA-1969F offers tips on use of welding cable and includes data on cable sizes preferred for various welding machine ratings.

26. Diesel Powered Tractors

Caterpillar Tractor Co.—20-page illustrated booklet form No. 9778 presents information on use of diesel powered tractors for mobile, flexible power in industrial plants. Use of Traxcavator equipped tractor in handling foundry sand is shown.

27. Alloy Iron

Fulton Foundry & Machine Co.—Two illustrated folders set forth features of Meehanite metal. "Special-Iron Castings for Heavy Machinery" is title of article describing uses of Meehanite for large industrial machinery. Circular No. 500 covers service for salvage of machine parts.

28. Industrial Power Trucks

Clark Tructractor Div., Clark Equipment Co.—16-page illustrated bulletin entitled "Clark Trucloader Method" illustrates wide range of industrial power fork truck applications, shows recommended practices and covers features of 1000, 2000, 3500 and 6000-pound capacity fork trucks.

29. Pattern Compound

Foundry Div. Tamms Silica Co.—6-page illustrated broadside contains data on Tamastone pattern compound. Unusual and interesting foundry applications are cited by case histories from various foundries. Other foundry specialties are described also.

30. Castings & Patterns

Howard Foundry Co.—54-page plastic bound illustrated brochure presents data on wide range of ordinary and difficult castings including aluminum, magnesium, bronze, brass and semi-steel materials. Technical information and casting specifications are given.

31. Diamond Tools & Nibs

Desmond-Stephan Mfg. Co.—4-page illustrated bulletin No. D-8 entitled "The Desmond Diamond Tool Reference Guide" contains dimensional data and prices on Tru-Set diamond tools and nibs. Hand tools, wheel dressers and straight shank diamond tools and nibs are presented. Pointers on proper use of tools are included.

32. Hydraulic Lift Trucks

LYON-Raymond Corp. — 4-page illustrated bulletin No. 220 covers line of hydraulic pallet lift trucks. Illustrations show operation with pallets, recommended pallet construction and adaptability of various materials to palletizing. Sizes, dimensions and specifications are included.

33. Tempering Furnaces

Surface Combustion Corp.—4-page illustrated bulletin No. SC133 describes different types of furnaces recommended for tempering of various kinds and shapes of ferrous objects. Furnaces covered include forced convection, oven and pot types. Table giving effects of tempering temperatures on hardness is included.

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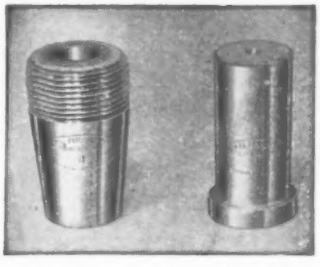

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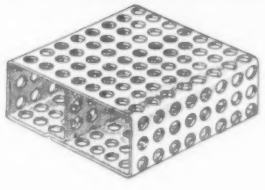

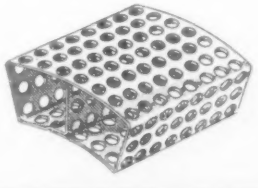

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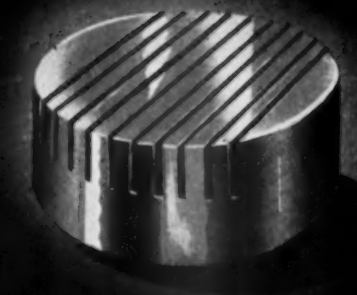

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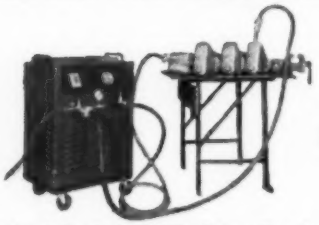

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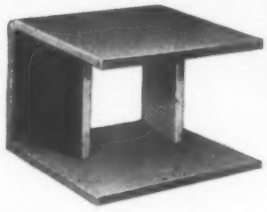

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★ Burn in more easily
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Your requirements may be met with Buffalo "Angle Stem" (Single) or "Double Angle" Chaplets, in a range of four metal gauges. Complete information, samples and prices promptly furnished.

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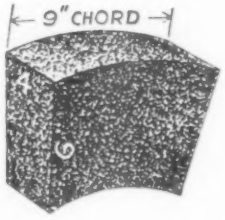

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48-60	7 3/16	48	60	21
54-66	7 3/8	54	66	23
60-72	7 1/2	60	72	26
66-78	7 5/8	66	78	28
72-84	7 11/16	72	84	30
78-90	7 13/16	78	90	32
84-96	7 7/8	84	96	34
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102-114	8 1/16	102	114	40
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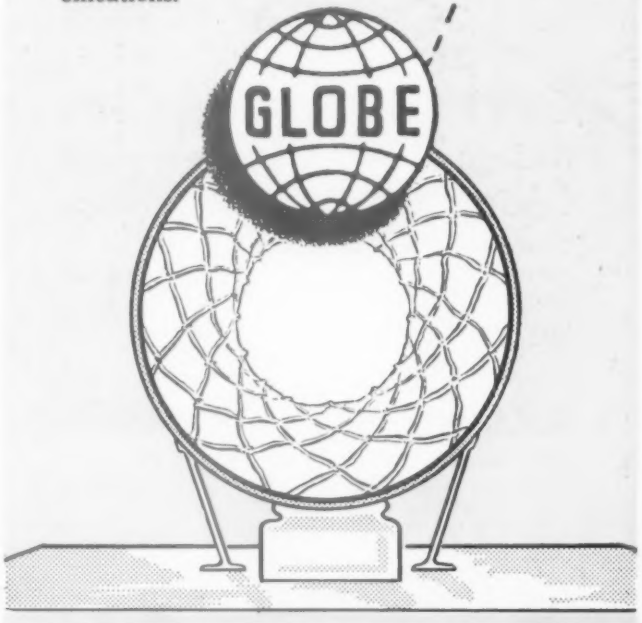

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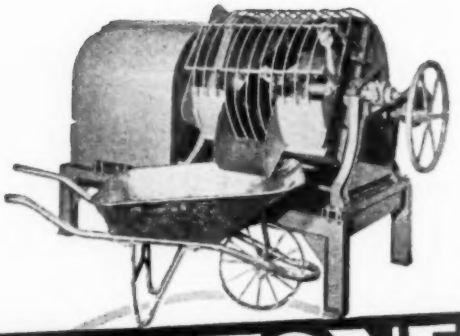

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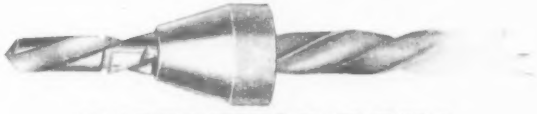

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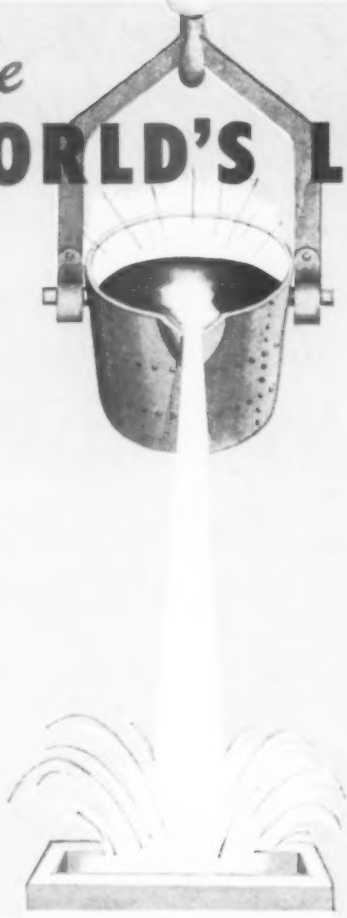

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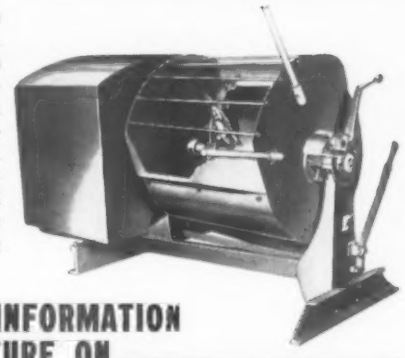

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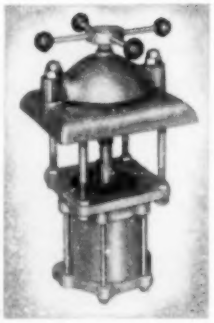

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Special Type for
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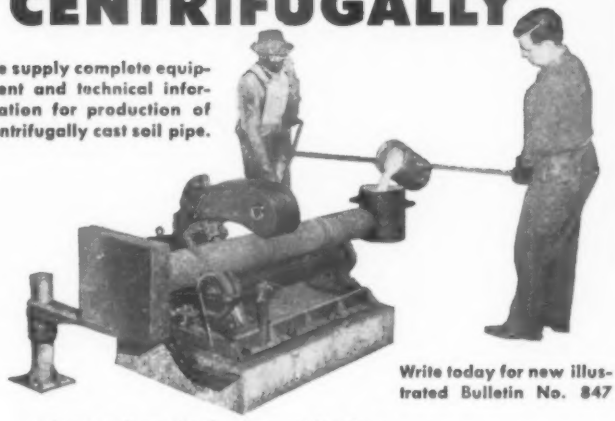

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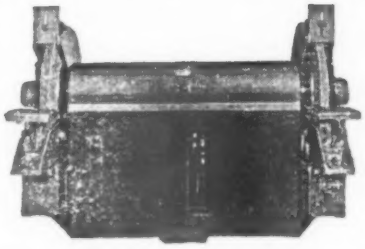

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Miller & Company, 332 S. Michigan Ave., Chicago 4. Ill.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTITANIUM

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Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
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Chas. Taylor Sons Co., P.O. Box 58, Annex Sta., Cincinnati, Ohio

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Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio

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Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
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Standard Electrical Tool Co., 2488 Riverside Ave., Cincinnati 4, Ohio.
N. A. Strand Co., 5001 N. Wolcott Ave., Chicago 40, Ill.
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For large middle-west ferrous foundry. Please state age, salary expected, experience in detail, firms worked for and when available in first letter. Address: Box 341, The FOUNDRY, Cleveland 13, Ohio.

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For old established gray iron foundry pouring 15 to 20 tons. Principal production from squeezers and rollover machines. State age, experience and salary expected. Address: Box 372, The FOUNDRY, Cleveland 13, Ohio.

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In a modern equipped mechanized brass foundry. Good opportunity. Must have thorough knowledge of foundry and oil furnace practice. State age, experience and salary expected. Address: Box 274, The FOUNDRY, Cleveland 13, Ohio.

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In steel foundry located in Eastern Pennsylvania producing acid electric castings up to 3000 lbs. In reply state age, experience and salary desired.

BOX 270

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To operate coreroom of 200 employees. Must have ability to organize and to manage efficiently production and inspection of all cores used in the manufacture of gray iron castings for automotive, farm equipment, machinery and other miscellaneous work. Need tactful supervisor, familiar with core blowing machines, bench and other types of work. Write in detail experience, education, references and age. Address: Box 301, The FOUNDRY, Cleveland 13, Ohio.

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Gray iron foundry making small sand medium sized castings requires core room foreman preferably with valve castings experience. Give full experience, references and salary in first letter.

BOX 271

THE FOUNDRY CLEVELAND 13, OHIO

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Fully experienced in nonferrous metals, cores and pattern work on light pressure-tight castings. Give full information regarding yourself, salary expected and references.

BOX 335

THE FOUNDRY CLEVELAND 13, OHIO

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Gray iron foundry making small, medium and large castings. Currently employing 8 to 10 persons in coreroom but this number will probably be increased.

BOX 371

THE FOUNDRY CLEVELAND 13, OHIO

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Normal production 15 to 20 tons daily. Must be able to handle men and direct foundry operations. Work consists of small and medium castings on squeezers and rollover machines, together with some floor moulding. Good opportunities for hustler. State age, experience and salary.

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Excellent opportunity for man with good metallurgical background, proved administrative ability and experience in smelting or foundry operations, preferably light metals. Write giving full details.

BOX 331

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Small, well-established nonferrous foundry in Detroit area. Must be fully familiar and have practical experience with all phases of foundry work, including gating and risering and able to take complete charge of all manufacturing operations. Excellent opportunity. State age, experience and salary expected. Replies will be treated confidentially. Address: Box 324, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Fully experienced in brass, bronze and aluminum production. To supervise Ohio manufacturer's foundry of 125 employees, including core and pattern departments. Sub-foremen are capable and fully experienced. Applicant must be alert, able to handle men, assume responsibility and furnish good references. State salary and give full particulars. This position is permanent. Address: Box 334, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

For production grey iron foundry located Middle West. Must be expert jolt squeezer operator. Address: Box 358, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Experienced brass foundry superintendent. Address: Box 325, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

LARGE MANUFACTURER OF SMALL SPECIALTY STEEL CASTINGS, LOCATED IN THE EAST HAS OPENING FOR QUALIFIED MAN WITH BROAD EXPERIENCE. THOROUGH KNOWLEDGE OF SAND TECHNIQUE, CORE MAKING, PATTERN DESIGN, MELTING AND ABILITY TO HANDLE MEN ESSENTIAL. EXCELLENT OPPORTUNITY.

BOX 378

THE FOUNDRY CLEVELAND 13, OHIO

Positions Wanted

STEEL FOUNDRY MANAGER
OR
SUPERINTENDENT

Twenty-two years supervisory experience producing carbon, low alloy and high alloy steel castings, starting as molding foreman through to works manager. College degrees in engineering and metallurgy, but primarily a practical foundryman with complete knowledge of all phases of production, modern foundry techniques, laboratory control, heading and gating, furnace operation, molding, heat treatment, cleaning and finishing, maintenance, plant layout, and labor relations. Have increased efficiency, trained men, cut scrap and costs, administered incentive and bonus plans and improved safety record. Capable of assuming complete charge of plant operations. Address: Box 364, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT
GRAY IRON, NONFERROUS METALS

Practical foundryman with many years experience in gray iron, semi-steel and nonferrous metals. Light, medium and heavy castings such as copper, aluminum, red brass, yellow brass, manganese bronze and aluminum bronze. Experienced in jobbing semi-production and mechanized foundry set up. Understand patternshop, molding, coreroom, grinding, cleaning and shipping room. Age 40, married. Employed as foundry superintendent. Desire change. Address: Box 312, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Practical molder and core maker on all classes of work. Understand cupola operation thoroughly and read blue prints. Have technical training. At present employed. Married. Address: Box 198, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Positions Wanted

PATTERN FOREMAN

General experience both wood and metal patterns for jobbing or production work where cast plates or mounted pat'erns are used on machine molding. Core room work using core blowers and driers on all type work. Can handle men and apprentices to produce a day's work. Capable estimate costs, layout work and check patterns and castings. Also trouble chaser on foundry work. Can handle small shop as working foreman and do accurate master and metal work. General foundry experience on gates and risers. Also trouble check on work to prevent loss in foundry. Available May ten'h. Address: Box 374, The FOUNDRY, Cleveland 13, Ohio.

PRACTICAL FOUNDRYMAN

Eighteen years' practical experience in foundry work, dry and green sand, jobbing and machine. I.C.S. foundryman's diploma. Age 40, married. Desires connection with well established concern where a man can build a sound future for himself and family based exclusively on his experience, desires, determination and general qualifications. Prefer a personal interview. Please advise in reply. Address: Box 328, The FOUNDRY, Cleveland 13, Ohio.

STEEL AND GRAY IRON FOUNDRY MANAGER OR SUPERINTENDENT

Graduate chemical and metallurgical engineer, age 33, with several years' practical foundry experience and operational management, will be available May first. Capable of assuming complete charge of operations with an ability for mass production of high quality castings at reduced cost. Address: Box 303, The FOUNDRY, Cleveland 13, Ohio.

PATTERNSHOP SUPERINTENDENT

Desires change. Capable of taking complete charge of shop to insure good work at reasonable costs. Jobbing or production. Estimate from prints, wood or metal. Thorough knowledge of foundry practice in steel, grey iron and nonferrous metals. Address: Box 359, The FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Invites confidential correspondence with owner of established medium-size business requiring mature, dependable directing experience in management, sales, finance and production. Ability to carry complete responsibility and produce consistent sales and production costs and net results assured by previous record. Excellent experience iron and brass foundries, machine and related lines. Address: Box 369, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY DESIGNER

Desires connection with foundry contemplating expansion, modernization or mechanization program. Over ten years' experience with leading foundry consulting engineers. Wide and practical experience in aluminum, brass, gray iron, malleable and steel foundry design. Good working knowledge modern equipment, conveying and sand handling systems and modern industrial building design. Address: Box 289, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Practical foundryman, molder by trade, technically trained in modern scientific laboratory controls of sand and metal and handling of mechanized equipment. Broad background of experience in a diversified line of quality castings, machine tool, diesel motors and pressure castings. Knowledge, ability and charac'er of the highest. Wants connection as superintendent with reliable Eastern firm needing real foundryman. Age 47. Address: Box 343, The FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY EXECUTIVE

IF YOU ARE IN NEED OF A STEEL FOUNDRY EXECUTIVE, AGE 50 WHO HAS HAD 25 YEARS' EXPERIENCE (18 OF THEM WITH THE COMPANY NOW CONNECTED WITH) IN ALL PHASES OF THE GAME, FROM MAINTENANCE ENGINEER TO MANAGER WRITE: BOX 373, THE FOUNDRY, CLEVELAND 13, OHIO.

FOUNDRY SUPERINTENDENT

Thirty-two years' foundry experience. Twenty-five years as Foundry Superintendent. Capable of taking complete charge of all foundry operations, both ferrous and nonferrous. Good connection more important than a large salary. Address: Box 257, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRYMAN

Desires position as foreman on light production or jobbing, soil pipe and fittings. Gray iron or nonferrous. Twenty-one years' experience. Molder, coremaker and foreman. Have complete charge of gray iron foundry at present. Prefer Central or Western New York. Address: Box 202, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Qualified grey iron foundryman, 18 years practical and technical experience in production and jobbing foundries making castings 1 lb. to 20 tons. 36 years of age and a good producer. Address: Box 320, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Practical foundryman, technically trained in modern foundry practice. Experience covers producing heavy to light castings in green and dry sand and all core molds. Rigging and gating for economical production on machines. Experience covers all departments. Good cupola and metal man. Address: Box 344, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

With eleven years' experience as superintendent of two steel foundries of good reputation. Light and medium work. Various types of production and miscellaneous bench and floor work. Good knowledge of all departments including mechanical and electrical maintenance. Address: Box 306, The FOUNDRY, Cleveland 13, Ohio.

MANAGER OR SUPERINTENDENT ALUMINUM AND MAGNESIUM FOUNDRY

Many years' experience with magnesium and aluminum quality castings. Know all modern methods of melting and producing in both alloys. Good organizer. Capable of quality production and successful operation of all departments. Decidedly cost conscious. Best references. Address: Box 250, The FOUNDRY, Cleveland 13, Ohio.

PERSONNEL DIRECTOR OR MANAGER

Twenty-five years' experience in all phases of personnel work including dealing with unions from grievances through contract making. Nine years' experience in iron-steel foundry. Available at once. Address: Box 282, The FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY SUPERINTENDENT

Practical trained foundryman covering 35 years on all types of castings is seeking a change. Married. Can furnish best of references as to character and ability. Address: Box 299, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER OR SUPERINTENDENT

Wide experience in production work, general jobbing, practical molder, green sand, dry sand, loam and machine work. Cupola expert, melter and mixer. Good executive and very successful in training men. Can furnish reliable estimates on foundry work. Address: Box 319, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Practical foundryman with thirty years of thorough knowledge of all phases of gray iron foundry activities in production and jobbing foundries. Good record handling union labor. Past eleven years as foreman and superintendent. Address: Box 375, The FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER FOREMAN

Twenty-six years' experience in wood patterns for gray iron and nonferrous metals, both large and small. Layout, drafting, estimating and thorough foundry knowledge. Age 41. Address: Box 323, The FOUNDRY, Cleveland 13, Ohio.

TIME STUDY ENGINEER

Desires position with a well established malleable or gray iron foundry. Thorough knowledge of foundry practice. Capable of improving methods and initiating new incentives in various departments. Address: Box 349, The FOUNDRY, Cleveland 13, Ohio.

CHARGE OF CORE ROOM

Desires position in charge of core room. Must be in complete charge. Have over twenty years' experience. Honest and ambitious. Experienced in grey iron and aluminum. Address: Box 360, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

DO YOU want to increase your production and reduce your foundry cost? You can, through mechanization, plant layout, wage incentive, methods improvement, production control, cost control and sand control at a very reasonable cost. Address: Box 361, The FOUNDRY, Cleveland 13, Ohio.

MANUFACTURING EXECUTIVE

Desires position where his broad experience can help meet competitive conditions ahead. Graduate engineer with experience in operating foundries, machine shops and fabricating shops. Address: Box 305, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Practical foundryman with technical training. Thirty years' experience, including fifteen years of supervision. Well versed in all phases of jobbing and production work in both gray iron and nonferrous metals. Progressive and up to date in modern methods of production. Capable of taking complete charge of medium sized foundry. Available on short notice. Address: Box 300, The FOUNDRY, Cleveland 13, Ohio.

CHIEF METALLURGIST

For research, control or contact work. Has organized and supervised large metallurgical departments. Twenty-five years' continuous foundry experience. Capable of heading up a bureau or service. Master's degree. Now employed. Address: Box 254, The FOUNDRY, Cleveland 13, Ohio.

PRODUCTION MANAGER

Successful practical planner, 25 years' experience including sales, machine shop and foundry. Address: Box 111, The FOUNDRY, Cleveland 13, Ohio.

PERMANENT MOLD FOUNDRYMAN

Graduate engineer experienced in design, construction and operation of permanent molds for aluminum seeking connection with progressive concern interested in establishing or developing a permanent mold operation. Address: Box 345, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS FOUNDRYMAN

Want position as superintendent or general foreman in full charge. Practical nonferrous foundryman, technically trained. Broad working knowledge of all activities in production and jobbing foundries. Good rigger and can handle men. Address: Box 346, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRY MANAGER OR SUPERINTENDENT

McLain graduate, 25 years' experience in all phases of production or jobbing, also pattern engineering. Wishes to connect with medium sized foundry. Eastern states preferred. Address: Box 264, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERVISOR

Graduate engineer—8 years' experience in molding, melting, supervision and plant maintenance. Jobbing and some production work, half pound to eight tons. Pit, floor, bench, jolt squeeze, rollover and slinger. Address: Box 370, The FOUNDRY, Cleveland 13, Ohio.

PERMANENT MOLD DESIGNER

Aluminum castings. Young designer looking for a position with good opportunities. Experienced in designing molds and other phases of permanent molding. Willing to prove my ability. Address: Box 322, The FOUNDRY, Cleveland 13, Ohio.

AVAILABLE AT ONCE

Foundry foreman, superintendent or master mechanic. Thirty-two years' experience, twenty-eight in supervisory capacity. Experienced in all lines foundry, coremaking, pattern making. Fourteen years in Latin America, one year in the Orient. Best of references. Address: Box 377, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS SUPERINTENDENT

Over twenty years as brass and aluminum foundry foreman and superintendent. Thoroughly experienced in the operation of sand slingers and core blowing machines. Address: Box 340, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Positions Wanted

GRAY IRON FOUNDRY EXECUTIVE

Technical education in metallurgy and business administration with an unusual practical background in all classes of light and medium castings. Experienced in developing stable organizations for improved operations, qualified record in maintaining excellent employee and customer relations. Address: Box 367, The FOUNDRY, Cleveland 13, Ohio.

Correspondence Course

GOOD FOUNDRYMEN ARE NOT AN ACCIDENT—THEY DO NOT MERELY HAPPEN

Foundrymen who will add the concisely arranged information on mixing, melting, and semi-steel to their store of experience will prove a valuable asset to any firm. Even though you know 90% of what we offer, the remaining 10% may be causing your firm large losses. Our report on your melting may be worth the fee alone. Remember, semi-steel is the purest, hottest and strongest metal made in the cupola. Synopsis free.

McLAIN'S SYSTEM INC.
236 E. NORTH AVE.
MILWAUKEE 12, WIS.

Open Capacity

OPEN CAPACITY

We have just increased the capacity of our foundry and are in a position to accept one or two particular customers who require quality and prompt delivery of aluminum castings. We also specialize in match plates and pattern castings.

PAASCH AND ROBBINS
352 EIGHTH ST. MOLINE, ILL.

OPEN CAPACITY

Open capacity for aluminum sand castings from smallest castings up to 250 pounds. Jobbing and production work.

NEWARK ALUMINUM CASTINGS FOUNDRY
96 WALDO ST.
NEWARK, OHIO

OPEN CAPACITY

Squeezer, jobbing, rollover work in grey iron castings. Quality and prompt service assured. Prefer squeezer assignments from mid-west section near our Kansas plant. Address: Box 339, The FOUNDRY, Cleveland 13, Ohio.

OPEN CAPACITY

In New England foundries for most sizes and types of gray iron castings. Mail specifications and inquiries to: Box 338, The FOUNDRY, Cleveland 13, Ohio.

LIGHT GRAY IRON CASTINGS

Production shop located in Western Pennsylvania has open capacity. Immediate deliveries. Address: Box 356, The FOUNDRY, Cleveland 13, Ohio.

OPEN CAPACITY

Foundry in Northwest Illinois has open capacity for all kinds of aluminum castings (sand) if it is quality, quick service and reasonable prices you want. Address: Box 326, The FOUNDRY, Cleveland 13, Ohio.

AVAILABLE CAPACITY

Our foundry has open capacity to supply small and medium size gray iron castings. Send sample. Address: Oregon Castings Co., RD 3, Lititz, Pa.

GRAY IRON CASTINGS

We have open capacity for production runs on squeezer and cope and drag work. Address: Box 368, The FOUNDRY, Cleveland 13, Ohio.

Open Capacity

OPEN CAPACITY

We have open capacity for aluminum and brass castings, excellent workmanship, reasonable prices, prompt delivery. Address: ARROW FOUNDRY CO., P. O. Box 141, FREEPORT, ILLINOIS.

Accounts Wanted

MANUFACTURERS REPRESENTATIVE

Former foundryman, mechanical engineer, desires ferrous and nonferrous alloy accounts, or foundry equipment in Ohio, Pa., West Virginia. Good contacts steel and industrial trade. Fifteen years' successful selling. References furnished. Address: Box 347, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EQUIPMENT

Mechanical engineer-foundryman can efficiently handle sales and service of foundry equipment and supplies. Commission basis. Ohio and Pennsylvania. Successful sales and engineering experience. Can we meet to discuss details. Address: Box 351, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY REPRESENTATIVE

Ferrous and nonferrous alloy accounts desired by former foundryman in Ohio, Pennsylvania and New York state. Eighteen years' successful selling. Good contacts in industrial trade. Excellent references. Address: Box 350, The FOUNDRY, Cleveland 13, Ohio.

Foundries for Sale

CALIFORNIA FOUNDRY

One of the largest privately owned iron foundries in the state, in daily production, will show profit first day. Price $50,000—$20,000 cash and owner will finance balance to responsible party. Will give 10 year lease on new buildings and two acres land with option to buy. Unusual opportunity. Owner has other interests.

BOX 365

THE FOUNDRY CLEVELAND 13, OHIO

GRAY IRON FOUNDRY

in Denver, Colorado for sale, including business and real estate. Good trackage. Doing about $100,000 a year business mostly with Railroads. Orders for 2 years' work on hand. Capacity about 40 tons a day. Price, including 2 cupolas, 2 cranes, freight elevator, etc., $100,000.

T. C. HITCHINGS & SON
810-14TH STREET
DENVER, COLORADO

PRODUCTION FOUNDRY FOR SALE

15,000 sq. ft—5 acres—steel and cement block bldg. 8 jolt squeezers—4 jolt rollovers—2 strippers—Pangborn rotoblast—12 ft. table, 42 in. Whiting cupola (capacity 15 to 20 tons per day)—2 core ovens—large assortment of snap flasks. On main highway 30 miles North of Detroit. A going business. Will sell control or 100%.

MR. D. VINCENT
WARDELL SHERATON HOTEL
DETROIT, MICHIGAN

FOUNDRY FOR SALE

Aluminum permanent mold foundry, producing building specialties; national distribution. $200,000 a year business. Owner must sell at once, no reasonable offer will be refused. Address FLORIDA DIE CASTING FOUNDRY, P.O. BOX 1589, ORLANDO, FLA., PHONE 2-1838.

FOUNDRY FOR SALE

Well equipped jolt squeezer production light grey iron foundry located in Middle West. 50,000 sq. feet buildings. Good supply raw materials. Address: Box 357, The FOUNDRY, Cleveland 13, Ohio.

Foundries for Sale

FOR SALE

Florida Aluminum Foundry, with capacity of 20,000 lbs. monthly. Mechanized, to make 300 to 500 sand molds per day, with 5 to 8 men. No high priced help required. Especially adapted to cast pallets for concrete block machines, and a variety of similar castings, in demand in this area, where aluminum is replacing iron to avoid corrosion. Lease to land and building only $40 per month. List of previous and current customers furnished. Owner is mechanical engineer, who developed this small efficient plant to meet Florida need for aluminum castings, but has been called from this locality to look after other interests. Good opportunity for man who wants to own and operate small foundry without much competition. Address: JAX-ALUMINUM PRODUCTS—1820 HARPER ST., JACKSONVILLE, FLA.

WEST COAST STEEL FOUNDRY FOR SALE

Going steel foundry well situated, with good market. Production capacity 200 tons per month of carbon and low alloy steels. Foundry now operating with good equipment and full personnel. Address: Box 277, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Modern nonferrous foundry located in Southern California, Los Angeles area trackage. Other business connections forces owner to sell. Excellent opportunity. 3500 lb. capacity job. Address: Box 337, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Small gray iron jobbing foundry located in Arizona. Well equipped. Address: Box 366, The FOUNDRY, Cleveland 13, Ohio.

GOING FOUNDRY FOR SALE

Grey iron foundry, equipped for floor bench and machine (2 squeezers) molding, located Boston, Mass., vicinity. Ideal as captive foundry. Easily produced over 40 T per month of difficult castings, each weighing from 4 oz. to 400 lb. just on bench and floor jobs. $30,000 buys land, building, equipment, et al. Address: Box 314, The FOUNDRY, Cleveland 13, Ohio.

Employment Service

SALARIED POSITIONS
$2,500-$25,000

This thoroughly organized confidential service of 37 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 Dun Bldg. Buffalo 2, N. Y.

SALARIED PERSONNEL

$3,000—$25,000. This reliable service, established 1927, conducts confidential negotiations for high-grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, DEPT. T, 109 CHURCH STREET, NEW HAVEN, CONN.

Wanted-To-Buy

WANTED

Facilities for brass castings; core work and non-core work.

STONITE PRODUCTS CO.
4455 N. 6th ST.
PHILADELPHIA 40, PA.
TELEPHONE:
GE-5-1460

WANTED

To purchase small foundry about 6000 sq. ft. with 500# electric furnace. Preferably in the Middle West. Address: Box 363, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Core wire straightening and cutting machine Lewis No. 7 or equal. Prefer motor driven. Also No. 1 or No. 1½ Simpson Core Sand Muller. Must be in good condition. State prices. Address: Box 333, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Wanted-To-Buy

WANTED

2—Roots-Connersville Blowers #4 in good condition.
1—Cupola #4. Give make, age and condition.
1—Band saw Metal Production.
3—275 J Osborne Jolt Squeeze Molding Machine, or equivalent.
3—275 P.J. Osborne Jolt Squeeze Molding Machine, or equivalent.
3—210 P.J. Osborne Jolt Squeeze Molding Machine, or equivalent.
1—#242W or #243W Osborne Jolt Rockover and pattern draw or equivalent.
1—27" x 36" American Wheelabrator with motors and loading skip, or equivalent.
1—#358 or #359 Jolt Stripper, or equivalent.

BOX 317

THE FOUNDRY CLEVELAND 13, OHIO

WANTED

Surplus stocks steel shot and grit.

BOX 280

THE FOUNDRY CLEVELAND 13, OHIO

WANTED

Dust tight mixer for dry metallic powders—capacity approximately three tons per hour. Preferably with enclosed drive. Address: Box 329, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Type AA sand cutter, gas driven, cutting blades 52" wide, outside width of wheels 74". Address: Box 232, The FOUNDRY, Cleveland 13, Ohio.

WANTED

200 to 500# electric furnace with transformer and controls. Address: Box 362, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Automatic or semi-automatic plating conveyor for galvanizing and nickelling for small pieces. Write giving price and information to: AMERICAN UNION TRANSPORT, INC., 17 BATTERY PLACE, NEW YORK 4, N. Y.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

LABORATORY MIXER WANTED

Small sand mullor (laboratory size) wanted. Might consider small mulbaro-type unit. Address: Box 332, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Grey iron foundry with modern sand handling equipment. Daily capacity 20 to 35 tons. Address: Box 352, The FOUNDRY, Cleveland 13, Ohio.

WANTED TO BUY

Competent foundryman with 25 years' experience would like to join Midwest foundry as working foreman with the object of becoming a partner. Available capital. Address: Box 292, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Modern sand handling equipment. Address: Box 353, The FOUNDRY, Cleveland 13, Ohio.

Opportunities

OPPORTUNITY

We can furnish empty tight and slack wooden barrels also steel drums for your products. ADDRESS: BUCKEYE COOPERAGE STATION, C.P.O. BOX 1501, CLEVELAND, OHIO.

For Sale

FOR SALE

Pearce, peerless model, serial 2236R, 220 volt, 34 am. 35" canvas, continuous blue print machine, washer and dryer. Recently overhauled. Located in Akron, Ohio. Address: Box 330, The FOUNDRY, Cleveland 13, Ohio.

For Sale

FOR SALE

6—International Type R. J.—14" x 8"
4—International, Type R. J.—20" x 8"
1—Tabor Hand Rollover—20" x 8"
10—International, Type E.M.C., Special—20 x 62 x 5"
8—International, Type E.M.C., Special—14 x 30 x 5"

Core Grinders
2—Milwaukee Type #70—Price $1,750.00 ea.

1—Royer, N.D.P. Sand Separator — 2 H.P. 3/60/220 Motor
1—New Belt for N.D.P. Machine

1—Paxson Cupola, 90" dia., 50' high
Registered as an Approved Dealer by War Assets Administration. Send us your inquiries.

SCULLY MACHINERY & EQUIPMENT CO., Not Inc.
77 WEST WASHINGTON ST.
CHICAGO 2, ILL.—PHONE: STATE 5346

FOR SALE

1 slightly used International Type "F" rollover machine 31/37" x 16" draw equipped with air clamps, A-1 condition. Address: Box 327, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Kindt-Collins melting furnace, gas fired. Capacity 30 lbs. aluminum. Used slightly, ready to ship at once. Price $175.00. Address: INDUSTRIAL ALUMINUM FOUNDRY CO., 660 ST. CLAIR AVE., COLUMBUS 3, OHIO.

FOR SALE

New heavy duty motorized rod cutter, 65 cuts per minute; capacity: ¾ inch round hot rolled steel. Brand new. $890.00 f.o.b. Cleveland. Address: Box 772, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Fifteen steel jackets (5%) tapered, only used once. Like new with two rows welded angle irons reinforcement. Size 11" x 17" x 7" at a real bargain. Address: REDDIG ALUMINUM FOUNDRY, 3417 9th ST., ROCK ISLAND, ILLINOIS.

FOR SALE

Pallet Conveyor 356 ft. long variable speed with 59 Jeffrey heavy duty conveyor cards 48" wide, 60" long. 5 H.P. Motor—Good Condition. Mfg. by Jeffrey Mfg. Co.
1—16" Thermo Compressor—40 H.P.—220/440 V.—3 Phase—60 Cycle. Deliver 30,000 CFM—10 oz. Pressure—Good as new.
8—Thermo Exhausters—Spencer MIH, Class H with Westinghouse Motors 220/440 V.—3 Phase—60 Cycle—30 H.P.
For details and price, write, wire or phone.

CONDENSER SERVICE & ENGINEERING CO., INC.
HOBOKEN, N. J.

FOR SALE

1—Ransohoff Water Mill 36 x 60 side loading and end loading. Automatic star separation and star return. Complete with direct drive and in good condition.
1—Battery of four 24" x 54" tumbling barrels.
2—30" x 52" tumbling barrel only.
1—30" x 38" tumbling barrel only.
4—18" x 52" tumbling barrel only.

BOX 308

The FOUNDRY CLEVELAND 13, OHIO

FOR SALE

Moore Rapid lectromelt 3-ton type P, furnace, complete with all operating equipment and transformer. Also one Gisholt 40" vertical turret lathe with motor.

RIVERSIDE FOUNDRY
S & W CORPORATION
BETTENDORF, IOWA

For Sale

FOR SALE

ALL EQUIPMENT REBUILT & GUARANTEED IN STOCK
OVERHEAD ELECTRIC TRAVELING CRANES

	TONS	MAKE	SPAN	CURRENT
(2)	1¼	Shepard	18'0"	230-VDC.
(1)	20	Cleveland	50'0"	230-VDC.
(1)	25/5	Niles	80'0"	230-VDC.

ELECTRIC MONORAIL HOISTS

(1)—½-ton American LoHed 230-VDC.
(6)—½-ton Shepards, 230-VDC, 5-HP. motor HIGH SPEED, FL. OP., 30'0" lift.
(1)—1-ton Shepard 230-VDC., FL. OP.
SPECIAL: 7½-ton, 2-motor, cage operated, Shepard 230-VDC., 40'0" lift, enclosed for out door service, hoist 28/70-FPM., Trolley 400-FPM., an excellent hoist for scrap yard service or cupola charging.
ALL ABOVE IN STOCK OFFERED REBUILT & GUARANTEED.
SEND FOR OUR STOCK LIST OF A.C. & D.C. GENERAL PURPOSE, CRANES & MILL MOTORS, ELECTRIC BRAKES & CONTROL EQUIPMENT, MOTOR GENERATOR SETS, TRANSFORMERS, ETC., OF ALL SIZES.

T. B. MACCABE COMPANY
4300 CLARISSA ST.
PHILADELPHIA (40), PENNA.

FOR SALE

1—405 Osborn jolt roll-over pattern draw; jolt cylinder 12" dia. Pattern draw 18" max. flask limit 64".

BOX 309

The FOUNDRY CLEVELAND 13, OHIO

FOR SALE

1 Used #10 Whiting cupola, 24 tons per hour, equipped with charger, electric motor-driven positive blower and electrically operated bull ladle.

STANDARD METAL & MACHINE CO.
615 W. SHIPP ST.
LOUISVILLE, KY.
TELEPHONE: MAGNOLIA 1635

FOR SALE

1 Pair 33" x 54"
Steel Exhaust Tumbling Barrels
Spur Gear Drive

THE SOUTHERN DESK COMPANY
Hickory, N. Y.

FOR SALE

1 Tabor 40" power rollover power jolt in perfect condition.

UNIVERSAL MACHINERY AND EQUIPMENT CO.
32 EAST BROAD ST.
SHILLINGTON, READING, PA.

FOR SALE

One 1000 KVA electric furnace transformer for three phases 60 cycles 7200 volt power. Water-cooled and tap changing. Can be used as a power step down.

BOX 213

THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

Royer Sand Conditioner
Model NB-2
Used only a few months.
First class condition.

Inquire: LIVINGSTON, INC.,
MARSHALL, MICH.

Classified Advertising

For Sale

FOR SALE

REBUILT EQUIPMENT

International Machines
3—Type R Hand Roll
1—International Pin Lift
2—JS International Rollovers
1—16 x 8 Air Jolt Rollover HJ
1—16 x 8 HJ Rollover
1—Arcade rollover machine 32 x 48 table stationary.

Osborne Machines
1—560 Pin Lift

Herman Machines
1—Jolt Rollover

Tabor Machines
3—Pin Lift Machines

Sprue Cutters
1—Sprue Cutter with 2 HP. Motor, V Belt Drive

Core Machines
1—#2 Demmler Core Blowing Machine Used Two Months
1—Tabor Core Machine

Electric Riddles
1—Combs, V Type

Tumbling Barrels
2—36 x 60 with Speed Reducers & Motors

Sand Blast Cabinets
2—#4 Tilting Type
1—Hovel 30 x 36

Air Compressors
1—Curtis 4½ x 4½ with Motor & Tank

Sand Blast Cabinets
1—Type K. 48" x 48" x 42" with Dust Arrestor. Practically New

Ladles
1—8 Ton Worm Geared
1—3000 Worm Geared
1—5000 Worm Geared

We also make New Ladles

Core Ovens
1—Half Round with Five Shelves 51" High, 54" Wide 27" Deep. Coke or Gas Fired

We make new Core Ovens. Any Size & Type Desired. Shelf, Pull Out Drawer or Car Type

Core Plates

7½" x 10"	7½" x 18"
7½" x 12"	7½" x 20"
7½" x 14"	7½" x 22"
7½" x 16"	7½" x 24"

These are in ¼" Steel Plate

Core Plates, Ribbed
67 Pcs. 10" x 11"
47 Pcs. 16" x 18"
134 Pcs. 11½" x 12"
56 Pcs. 15" x 16" & 16" x 16"

Trucks
Hand Trucks #792 Fairbanks
6—Barrel Trucks, 2 Wheel, Rubber Tires
1—Automatic Lift Truck & Charger
Lyon-Raymond Hyd. Lift Truck 2500# Cap. Model CW-11-54

List of Steel Flasks

	Price per Set		Price per Set
17" x 27"— 4 Cope and 4 Drag	$11.00	18" Round—4" Cope and 3" Drag	7.00
12" x 31"—10 Cope and 10 Drag	14.00	18" x 20"—6½ Cope and 6½ Drag	12.50
11" x 14"— 4 Cope and 6 Drag	15.00	19" x 33"—6½ Cope and 3 Drag	12.50
19" x 18"—3½ Cope and 3½ Drag	7.50	17½" x 20"—6½ Cope and 3 Drag	11.00
12" x 31"— 7 Cope and 7 Drag	16.00	9 Cope and 3 Drag	11.00
18" x 19"—3½ Cope and 3½ Drag	11.00	13" x 35"— 6 Cope and 6 Drag	10.00

Miscellaneous Equipment

Chain Falls
2—1 Ton, New
2—5 Ton, New

Scales
2—Toledo Scales, New

Burners
5—Gas Burners

Riddle & Riddle Bottoms
20" Electric Riddle Bottoms
18" Hand Riddles, 5 Ply

Mixers
2—Blystone Mixers Motor Driven

Jolt Squeezers
2—Adams, Portable, Jolt Squeezers, Swing Head Type

Miscellaneous Equipment
1—Scleroscope
High Speed Motor & Blower for Brass
Furnaces different Sizes
15 Skids for Lift Truck
Assortment of New Emery Wheels
Air Grinders Portable
Air Bench Rammers
Air Floor Rammers
Vibrators
Chipping Hammers
2000 Ft of New ⅜" Air Hose
1000 Ft of New ¾" Air Hose
Branford Shakeout Vibrators

HAYNES FOUNDRY EQUIPMENT CO.
814 ADA ST. KALAMAZOO 52, MICH.

FOR SALE

2—#250 (750#) Walker-York tilting brass melting furnaces practically new.

1—Used Pangborn EN 2 hand sand blast cleaning cabinet.

THE GIBSON & KIRK COMPANY
WARNER AND BAYARD STREETS
BALTIMORE 30, MARYLAND
PHONE—LEXINGTON 1200

HYDRAULIC PUMPS

Aldrich Pump Co. Vertical Triplex HYDRAULIC PUMPS, 2¾" x 8", equipped with Herringbone Gears. 67.5 gpm. Maximum pressure for intermittent duty 2,200 lbs. for continuous duty 1,800 lbs. Pump and motor mounted on common bed plate.

Motors are 75 HP, 3/60/220-440 volts, 1740 RPM. Complete with starting panel, consisting of G.E. motorstarter switch, push button control, square "D" Switch, and capacitator.

Purchased new 3½ years ago. Excellent condition. Available for immediate delivery.

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CUPOLA BLOWER FOR SALE

1—General Electric Single stage centrifugal air compressor model 357-5300, 1.25 lbs. pressure 40 H.P. 3600 R.P.M. 3 phase 60 cycle, 220 volt direct connected motor with starter. Automatic air valve with instrument panel for a cupola size 48" to 54" at melting zone. All equipment in perfect working condition, just taken out of active service to permit installation of a larger blower. Reasonably priced.

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3305 WEST FOREST HOME AVENUE
MILWAUKEE 7, WIS.

FOR SALE

For Immediate Delivery
One used Ruemelin sandblasting unit.
Address all inquiries to

CHAMPION MOTORS COMPANY
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MINNEAPOLIS 13, MINN.

FOR SALE

1—#40 Model S.A. Davenport Rollover, excellent condition.
1—#34½" Whiting Lip Pouring Geared Ladle, never used.

BOX 318
THE FOUNDRY CLEVELAND 13, OHIO

CENTRIFUGAL CASTING MACHINE

We have a senior model Kalamazoo Universal spinning machine for sale, like new, with 1½ H.P. motor and 24" head, 220/440 volt, 60 cycle current. Price $1143.67 F.O.B. our plant. Address: Box 238, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE—USED FOUNDRY EQUIPMENT

2 Arcade #91 Jolt Squeeze Molding Machines, 10" squeeze cylinder, 4" jolt cylinder.
17 Arcade #81 Jolt Squeeze Molding Machines, 8½" squeeze cylinder, 3" jolt cylinder.
1 Arcade #105 Squeezer Molding Machine.
15 Adams Aluminum Snap Flasks 4" cope, 4" drag—various sizes.
1 Pangborn 48" x 54" type GK-21 Rotoblast Barrel—Ser. #21GK2-402 with skip hoist loader, 220 volt, 60 cycle, 3 phase, complete with motor control equipment.
1 Toledo dial platform scale, model 38—2741FE, 8' x 6' built in scale, complete with smooth ¾" steel plate 81 x 61 platform, 10 ton capacity.
1 Swing grinder with 7½ H.P. motor.
10 Pneumatic I-R & Thor grinders.
4 Size 001 Thor scaling and chipping hammers.
2 Core oven doors, 6' 9" high x 6' 0" wide x 6" thick, 5" rockwool insulation, complete with angle sliding jams and lifting mechanism; excellent condition.
137 Core oven panels (various sizes), 16 gauge metal, 5" rockwool insulation; tongue and groove assembly; excellent condition; manufactured by J. O. Ross Eng.
1 Stearns Magnetic pulley 12" dia. x 18" long with motor generator set.
2 Bristol Graphic Ammeters, Strip Chart type, late model.
1 Leeds & Northrup Potentiometer with 2 point recorder.
1 Four stage polishing machine for polishing specimens.
1 2,000 lb. capacity automatic electric platform lift truck. Type L-1, Serial #3364.
1 Fort Wayne battery charging set.

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P. O. BOX 443
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TEL. MITCHELL 2450

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(4) 675 cfm @ 6 oz., Spencer, driven by 2 HP, 220/440 V., 3 ph. 60 cycle 3600 RPM

PRESSURE BLOWERS

2100 cfm @ 10 oz. Spencer with 10 HP, 3/60 3400 RPM motor
1200 cfm @ 11 oz. Buffalo with 7½ HP, 220 volt, 3 ph. 60 cy. 1750 RPM
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800 cfm @ 24 oz. Amer. Blower with 10 HP, 220/440 volt, 3 ph. 60 cy. 3600 RPM
500 cfm @ 14½ oz. McKee 6 x 6 with 5 HP, 3600 RPM
250 cfm @ 12 oz. North American with 2 HP, 3/60 3450 RPM motor

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1552 HAMILTON AVENUE
CLEVELAND 14, OHIO

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Johnston & Jennings 918-B jolt rollover pattern draw molding machine. Table 44" x 54"—20" draw.

FAY & SCOTT CO.
DEXTER, MAINE

METAL RECLAIMING MILL

No. 5 size, a trade in for larger size, used about four years, as is without motor and V belt drive, good condition.

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YONKERS 2, N. Y.

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Gray iron foundry. 2 brick and steel buildings. 1—40' x 80'; 1—30' x 60', one block from railroad siding. 40 miles from Pittsburgh, Pa. Address: Box 234, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

1—Mahr, model No. 556-C-750,000 B.T.U. oil fired, portable mold dryer. Brand new—never used. Attractively priced for quick sale. Address: Box 315, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Sand cutter—One American Sand cutter, type AA, size 6', powered by one 10 HP 220v, 3 ph, 60 cy motor. Shakeout and flask loader—One Robins portable shakeout and flask loader, 3 ph, 60 cy, 220 v, new. Address: HILLSDALE FOUNDRY COMPANY, HILLSDALE, MICHIGAN

Classified Advertising

For Sale | For Sale

FOR SALE
OVERHEAD CRANES

1¼ Yd. Foundry Crane 48'1½" span

1-Ton
Detroit 38' Span
Shepard Niles 12'

2-Ton
Conco 12' Span
Chisholm Moore 25'

3-Ton
P&H 42'1½" Span
Case 51'2" Span
P&H 37'6" Span

5-Ton
Robbins & Meyers 20' Span
P&H 20' Span
Shepard 27'6" Span
Detroit 38'8" Span
P&H 75' Span
P&H 31'10" Span

6-Ton
Northern 46' Span

7½-Ton
Northern 26'7½" Span

8-Ton
P&H 60' Span
Hand-Operated 12' Span

10-Ton
Alliance 58'9" Span
Shepard Niles 27'7½" Span
Morgan 55'6" Span
Ederer 74'4" Span
Shepard 40' Span
2 Yd. Morgan 60' Span
Northern 49' Span
Shepard Niles 57'
P&H 87'6" Span
Niles 75' Span
Lane 60' Span
Shaw 80'9" Span
Ederer 70' Span
Toledo 77' Span
Whiting 48' Span
Shaw 67'6" Span
Morgan 38' Span

12½-Ton
Niles 75'1" Span

15-Ton
P&H 32' Span
Ederer 74'4" Span
New Albany 50'6" Span
Morgan 73'5½" Span
Morgan 82' Span
Bedford 34'6" Span
P&H 32' Span

20-Ton
Lane 50' Span
P&H 51'4" Span
Ederer 74'4" Span
Northwestern 60' Span

25-Ton
Bedford 14'6" 67'8" 46'2"
Leonard Burke 100' Span
Case 63' Span
New Albany 50' Span
Cyclops 74'4" Span

30-Ton
Ederer 55' Span
Ederer 66'6" Span
Whiting 74'4" Span
Ederer 40' Span
Northern 75' Span
Bedford 25'9½" Span
Cyclops 74'4" Span

40-Ton
Overhead Crane 150' Span

50-Ton
Morgan 50' Span
P&H 40' Span

150-Ton
Whiting 30' Span

200-Ton
Alliance 100' Span

Telephone us collect to discuss your requirements.
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49 VANDERBILT AVENUE, NEW YORK 17, N. Y.
TELEPHONE: MURRAY HILL 4-1616

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193# ⅝" Rd. Extruded Magnesium Rod
14570# Grakoat wash #2
330 Gal. Aromatic Solvent
480# Snow White Non-Silico Parting
120# #4 Acid violet concentrate
700# #1 Plumbago silver lead
330 Gal. Paraspray solvent
72# Yellow master core vent wax
15000# Coverall fluxing compound
2600# #3 Aluminum Fluxite
3800# #120 Flux (Core protection agent)
7000# Aluco Flux
10000# G. I. Powder
34 400# Drums #181 Sand Agent
700# .015 x 1¼" Dia. Core tine
4000# .011 x 2⅜" Dia. Core tine
3500# 18 ga. Bright Basic core wire 4" lengths
5000# 18 ga. Bright Basic core wire 3¾" lengths
7500# 18 ga. Bright Basic core wire 2¾" lengths

22 Chill Buggies 24 x 48 x 10" deep removable dump bodies.

Parts for Ingersoll-Rand chip hammers.

Parts for International & Osborne moulding machines.

20,000 Ceramic Strainers 4½" x 2½" x ¼" thick, with very small holes.

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J. M. GARVER

6314 SO. SACRAMENTO AVE.

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Monarch simplex #94 rotating aluminum and brass melting furnace, 2000 lb. brass capacity; good condition and is on skids ready for shipping $950. Address: FLORIDA DIE CASTING FOUNDRY, P.O. BOX 1589, ORLANDO, FLA., PHONE 2-1838.

COMPLETE EQUIPMENT OF IRON & BRASS FOUNDRY

Located in southern city. Price $4500—less than value of one piece of equipment. Carload of coke also included if sold immediately. Address: Box 294, The FOUNDRY, Cleveland 13, Ohio.

ROTOBLAST FOR SALE

1—No. 28, type GK rotoblast rocker barrel with a load capacity of 20 cu. ft., complete with motors, abrasive reclaimer, loader and many spare parts. This barrel was purchased new in 1942. Address: Box 269, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

One Parsons Engineering Corp. sandblast room complete with swinging doors and overhead hooks to convey materials through unit. Blast motors and elevators and two sandblast cars. This equipment is in excellent condition. Approximate use 7½ months. Size overall is approximately 15' x 15'. Address: Box 336, The FOUNDRY, Cleveland 13, Ohio.

EQUIPMENT FOR SALE

MOLDING MACHINES
10—75J Osborn Portable Jolt Squeeze, Strain Rod Type.
1—International Portable Hand Jolt, Hand Rollover, Foot Draw, Core Machine.
2—Tabor Plain Squeeze, Strain Rod Type.
3—Mumford 3" Cyl. Core Jolt, with 20" x 15" Table.

BLOWERS FOR CUPOLAS AND FURNACES
6—#805 General Blowers, 5 H.P., 3/60/220, 1400 C.F.M. at 8-oz. pressure.
1—North American 10 H.P., 3/60/220-440, 1300 C.F.M. at 16-oz. pressure.
1—North American 7½ H.P., 3/60/220-440, 1050 C.F.M. at 16-oz. pressure.
Maxon-Premix Blowers for Gas, ⅛ to 1 H.P.

METAL MELTING EQUIPMENT
2—#600 Hausfeld Single Burner Tilting Crucible Furnaces, Oil Fired. #150 to #175 Crucible Size.
1—#675 Hausfeld Single Burner Tilting Crucible Furnace, Oil Fired. #250 to #275 Crucible Size.
2—Hausfeld 1000# Aluminum Capacity Furnaces, Barrel Type, Open Flame, Oil Fired.
2—Hausfeld 2000# Aluminum Capacity Furnaces, Barrel Type, Open Flame, Oil Fired.
1—Aluminum Electric Heat Treating Unit, 75 KW, 220 Volt, Batch Type, with Basket and Quench Tank.
2—Hausfeld Open Flame Tilting Brass Furnaces, 400# capacity, Gas or Oil.
4—Stationary Gas Fired #60 Crucible Furnaces, with ¼ H.P. Maxon-Premix Blowers.
2—Monarch-Rockwell Rotating, 500# Brass. Oil.
New 32" to 41" Dia. Shell Cupolas made to order.

TUMBLING MILLS AND SAND BLAST
2—(New) Baird No. 3-D Oblique Tumbling Mills, 27" Dia. 30" deep, direct motor drive, with motor driven tilting mechanism. Load capacity approx. 400 lbs.
4—New Haven 36" x 46" Self Contained Sand Blast Barrels, Belt Drive.
2—Pangborn Syphon Feed Sand Blast Cabinets.
3—Portable Sand Blast Generator Tanks, 500# Sand Cap.

MISCELLANEOUS
1—Barrel Type Magnetic Separator, AC driven with DC Generator.
1—Heavy Duty Back Geared Sprue Cutter, 1¼" square knives, T & L pulley drive.
1—Power Sprue Cutter, 1" square knives.
1—No. 1 Blystone Sand Mixer, 7 cu. ft., 5 H.P. 3/60/220-440, motor connected.
1—Shuster Wire Straightener and Cut-Off Machine. Belt Drive.
1—20" Combs Gyratory Riddle.
1—Wadsworth Core Machine.
2—2000# Cap. Worm Geared Ladles, V-Bail.
1—2500# Cap. Worm Geared Ladle, V-Bail.
1—4000# Cap. Worm Geared Ladle, V-Bail.
1—Cloth Screen Dust Collector.
6—Worm Geared Tilting Ingot Mold Stands, 6' to 12' long.
1—Small Motor Driven Tumbling Mill.
1—Curtis Twin-Cylinder 15 H.P. 3/60/220 Air Compressor, with radiator and fan for self-cooling
1—No. 105 Schramm 4-Cylinder Air Compressor, 25 H.P. Size.
1—Core Oven 7' x 6' x 7' re-circulating hot air, truck rack type.
1—Gas Fired Hill & Griffith Semi-Circular Core Oven.
7—Hydro-Whirl, Wet Type, Dust Collecting Booths, suitable for Magnesium, Aluminum, Brass, etc. 5' x 3' working table and collecting system built as complete unit.
2—Hydro-Whirl, Wet Type, Collectors for double end grinders.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST.
CINCINNATI 3, OHIO
PHONE PARKWAY 7812

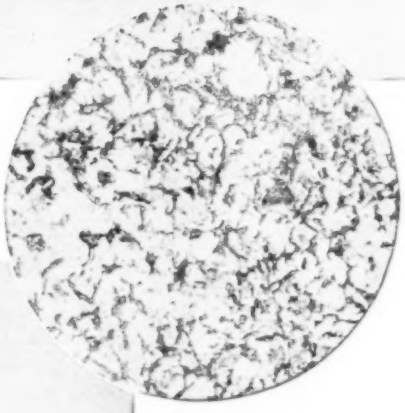
FOR SALE

Hines Snap Flasks, heavy duty, all pins ¾" diameter. Sizes and conditions as follows:
1—24 x 48", 12" C and 12" D 50½" pin centers—Excellent.
1—34 x 37", 12" C and 12" D 51½" pin centers—New.
1—30 x 30", 12" C and 12" D 33" pin centers—Excellent.
1—36 x 36", 12" C and 12" D 40" pin centers—New.
1—42 x 42", 12" C and 12" D 46" pin centers—New.
If interested, please contact
LEBANON STEEL FOUNDRY
LEBANON, PA.

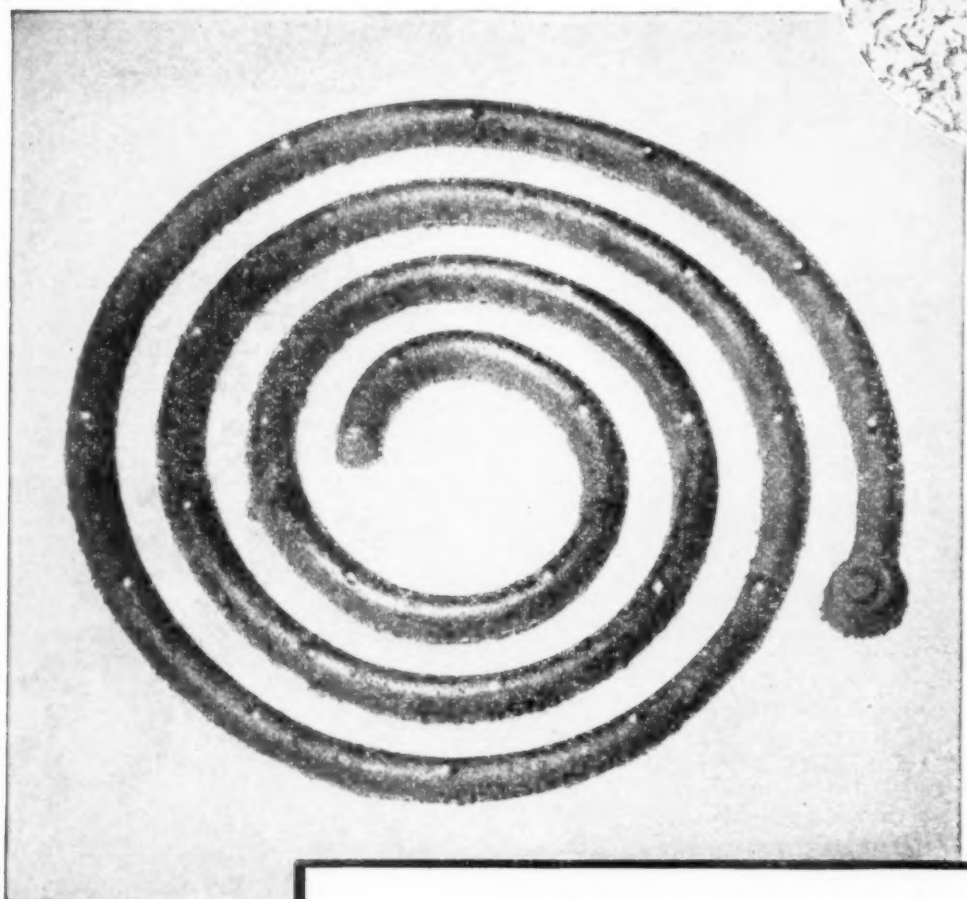
FOR SALE

One American sandcutter model AA 86/51 Equipped with new 4 cylinder gasoline engine. Original cost $5000.00. A-1 condition. Also with this machine there are new replacement parts which cost $800.00. Total selling price $3000.00. Address: Box 321, The FOUNDRY, Cleveland 13, Ohio.

G-IRON* gives you greater fluidity



*G-Iron is graphitized pig iron. The photographs show its grain structure. The photomicrograph (circle, etched, 500 diam.) shows the random graphite evenly distributed. Manufactured under U. S. and Canadian patents.



Standard fluidity test of a G-Iron casting, containing 2.08% silicon, 3.56 total carbon, measures 52 to 59 inches compared with ordinary iron which flows from 30 to 40 inches.

Greater fluidity of G-Iron and reduction in internal shrinkage help solve the problem of casting thick and thin sections without the danger of cold shuts and shrink pockets. Reduces scrap losses.

TONAWANDA
for sound castings

TONAWANDA IRON CORPORATION

NORTH TONAWANDA, N. Y.

Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

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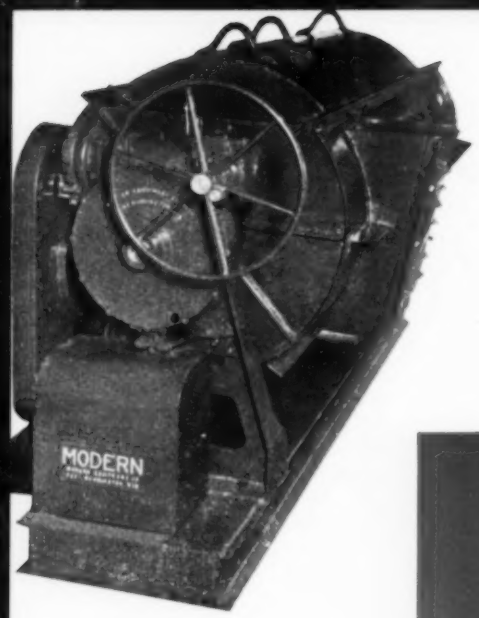

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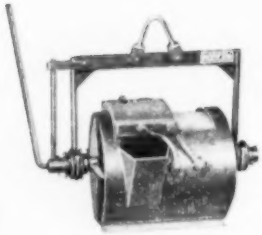

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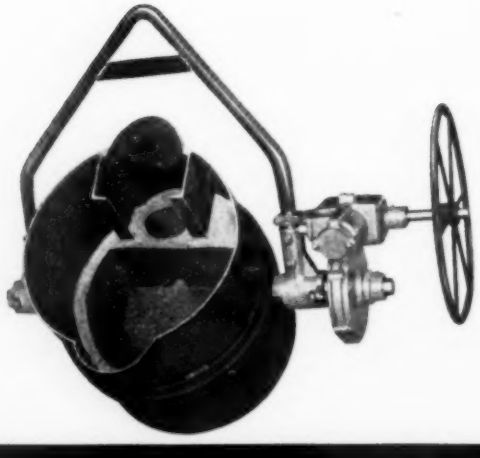

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Produces exceptionally fine finish and resists the most severe conditions of metal temperature and casting thickness. Used on cores for grey iron and Meehanite castings, including cylinder blocks, conveying equipment, woodworking machinery, compressors, furnaces and large jobbing castings.

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.93	Combined Carbon	.79
3.38	Total Carbon	3.36
1.84	Silicon	1.83
.30	Manganese	.27
.53	Phosphorus	.54
32,020 lbs.	Tensile Str. Per Sq. In.	33,750 lbs.
226	Brinnell Number	220
30*	Machinability	20*

Time in seconds required to drill through 1" tool bar with ½" twist drill at 50 lbs. pressure and 1,700 r.p.m.

Refining with Purite—in the cupola hearth or in the ladle—has found favor with foundrymen for over 20 years. This scientific flux not only removes sulfur, it purges molten metal of occluded gases, entrained oxide-silicates and other non-metallic impurities. Purite makes possible improved grain structure and machinability... faster production of cleaner, sounder castings.

As a typical example, Mathieson shows the effect of desulfurizing and refining with Purite in a U-shaped mixer ladle. Microphotographs, analyses and tests—made before and after treating iron with Purite—clearly illustrate the manner in which Purite reduces the size of graphite flakes, cleans the metal, and improves the strength and machinability of gray iron castings.

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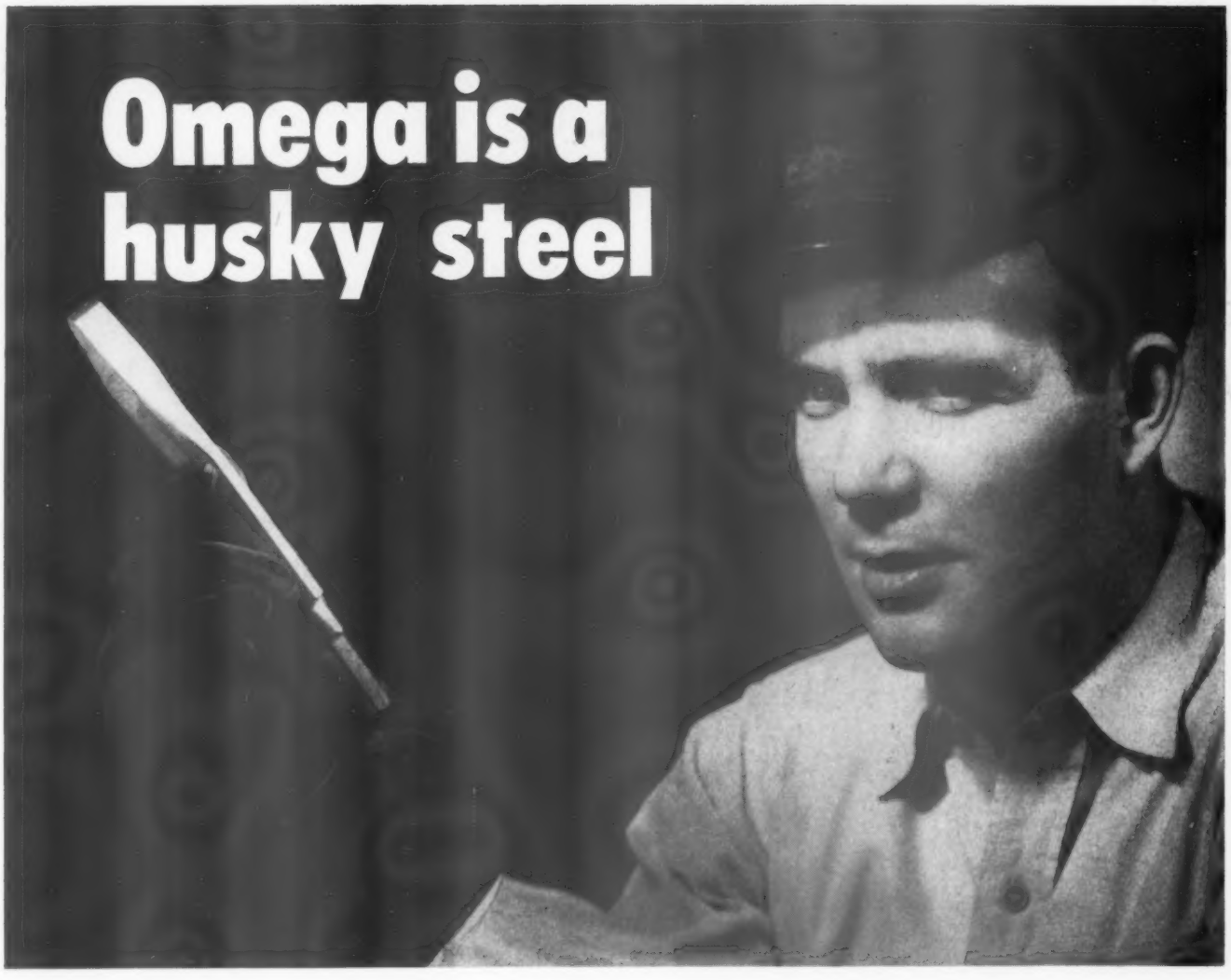
Omega is a husky steel



Here's a chisel steel that's plenty tough for your cold-battering jobs. Omega is super-resistant to shock. It keeps a keen cutting edge and takes hard knocks in its stride. All of which adds up to higher efficiency. That's why you'll find it the popular choice for chipping and core-breaking applications.

Omega is essentially a silico-manganese analysis, combining ductility with the ideal hardness for foundry service. Give it a trial —as rough as you want. You'll like the way Omega stands up.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

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QUICK FACTS ABOUT OMEGA

- Harden it in either oil or water.
- 58-60 Rockwell C normal working hardness.
- In its maximum heat-treated condition, its resistance to impact, using Charpy unnotched specimen, is approximately 130 foot-pounds.
- Typical Analysis:

C	Mn	Si	V	Mo
0.50	0.70	1.85	0.20	0.45

- Omega is easy to forge, machine, heat-treat.

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